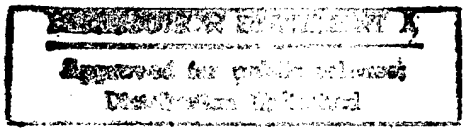
JPRS-CEA-86-123

9 DECEMBER 1986

China Report

ECONOMIC AFFAIRS

ENERGY: STATUS AND DEVELOPMENT--54



FBIS FOREIGN BROADCAST INFORMATION SERVICE

NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

PROCUREMENT OF PUBLICATIONS

JPRS publications may be ordered from the National Technical Information Service, Springfield, Virginia 22161. In ordering, it is recommended that the JPRS number, title, date and author, if applicable, of publication be cited.

Current JPRS publications are announced in Government Reports Announcements issued semi-monthly by the National Technical Information Service, and are listed in the Monthly Catalog of U.S. Government Publications issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Correspondence pertaining to matters other than procurement may be addressed to Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

NOTICE

Effective 1 January 1987 the following JPRS serial reports will no longer be published:

CHINA REPORT: AGRICULTURE

CHINA REPORT: PLANT AND INSTALLATION DATA

CHINA REPORT: RED FLAG

Material currently published in the CHINA REPORT: AGRICULTURE will be published in the CHINA REPORT: ECONOMIC AFFAIRS.

Material currently appearing in the CHINA REPORT: PLANT AND INSTALLATION DATA will appear in the CHINA REPORT: ECONOMIC AFFAIRS or in the CHINA REPORT: SCIENCE AND TECHNOLOGY.

The CHINA REPORT: RED FLAG will be published as a subtitled report of the series CHINA REPORT: POLITICAL, SOCIOLOGICAL, AND MILITARY AFFAIRS.

If any subscription changes are desired, U.S. Government subscribers should notify their distribution contact point. Nongovernment subscribers should contact the National Technical Information Service, 5285 Port Royal Road, Springfield, Virginia 22161.

JPRS-CEA-86-123

9 DECEMBER 1986

CHINA REPORT

ECONOMIC AFFAIRS

ENERGY: STATUS AND DEVELOPMENT--54

CONTENTS

COAL

OIL AND GAS

/12223

POWER NETWORK

POWER SUPPLY GROWS BUT STILL TRAILS DEMAND

HK110751 Beijing CHINA DAILY in English 11 Oct 86 p 1

[Article by staff reporter Xu Yuanchao]

[Text] Although China's soaring electricity production for the first 9 months [of 1986] passed the growth rate of industrial output value, the nationwide power shortage has not been ameliorated. In the first three quarters of this year, China generated 328 billion kilowatt-hours of electricity, about 76 percent of the year's target and 9.1 percent more than the same period last year, said Lu Yanchang, director of the Dispatching and Communications Bureau under the Ministry of Water Resources and Electric Power.

Lu told CHINA DAILY the growth rate for the power industry had exceeded the 6.4 percent growth rate for industrial production but the power shortage is still "severe" in some areas, particularly for coastal provinces.

Of the areas supplied by eight big power grids throughout the country, power shortages can affect Beijing,Tianjin, Tangshan and areas in central and southwest China as well as Guangdong Province.

Lu said the daily average of electricity generated totals 1.25 billion kilowatt-hours. The country is expected to produce 440 billion kilowatt-hours for the whole year, an estimated 7 percent increase over last year.

Facing a soaring growth in power consumption from industrial production and heating and lighting for households in the fourth quarter, the ministry is trying to complete construction of 5,500 megawatts of generating units before the end of this year, he said.

About 865 megawatts of generating units had been put into production by September, and another 1,850 megawatts of units are now in trial operation. A 300-megawatt generator, one of the four largest ones planned for the year, has gone into operation in Jianbi Power Plant which is near the peak-load center in Jiangsu Province. Another similar capacity generator in Louhe, Anhui Province, is in trial operation.

Guangdong, an energy-starved province in south China, has signed an agreement to barter coal for electricity from Hong Kong in a bid to ease its power shortage, according to the China Coal Import and Export Corporation.

Under the agreement, Guangdong will supply 1.2 million tons of coal to Hong Kong in exchange for 1 billion kilowatt-hours of electricity from the China Light and Power Company Ltd. of Hong Kong.

Because of its severe power shortage, each year Guangdong swaps drinking water for 850 million kilowatt-hours of electricity from Hong Kong, which means the electricity is more expensive. But this still cannot meet the rising demand for power in this coastal province which is short of 3.8 million kilowatt-hours per day, industry sources said.

This year the level of water storage in the country's major reservoirs "is not as good as last year," Lu said. Except for those in Northeast China, water levels in 12 large reservoirs have greatly dropped so that most hydropower stations have insufficient water supply to generate electricity. These reservoirs are short of 5 million cubic meters of water, according to ministry statistics.

To ensure power supplies in the peak season, the ministry will allocate more fuel to thermal power plants which, in the first 9 months, had stored 6.3 million tons of coal, about 5 percent more than the same period last year.

/12624
CSO: 4010/4

POWER NETWORK

NORTH CHINA GRID BEEFS UP FACILITIES

OW280336 Beijing XINHUA in English 0135 GMT 28 Jun 86

[Text] Beijing, 28 Jun (XINHUA)--The North China [Power] grid is introducing 300-megawatt and even larger thermal generating units, a senior power official said here today.

It is turning into an ultra-high voltage electricity network consisting of 500kV transmission lines, and will eventually be linked to the northwest, northeast, and east China grids to form an integrated nationwide electricity supply network.

Zhang Shaoxian, director of the North China Electric Power Administration, said that its short-term construction plan was to install more large generating units, and to continue to set up 500kV transmission and transforming equipment.

This would change the north China grid into a power system with 500 kV lines as the trunk circuit loop, and microwaves as the main channels for network control, communications, dispatching, and data transmission.

The grid supplies electricity for Hebei and Shanxi provinces, Inner Mongolia Autonomous Region, Beijing and Tianjin, and has a total generating capacity of more than 11,000 megawatts at present.

Zhang said that to ensure safe and economical operation of the grid and to improve its automation, the administration had imported several complete ranges of equipment for network dispatching, high-efficiency power transforming, power cables, microwave protection and audio-frequency load-control equipment.

The north China grid has imported more than U.S. $600 million worth of equipment and technology over the past few years. But demand for power is still not being met.

It now needs more smaller facilities, new types of fireproof distribution equipment, underground substation equipment, integrated distribution equipment and automatic control devices to upgrade urban distribution systems.

Last year, the country's total installed generating capacity was more than 86,000 megawatts, and annual electric power generation was 407.3 billion kWh, but this still fell short of demand.

To overcome the shortfall, new generating units with a capacity of 54,000 megawatts will be built over the next 5 years.

/8918
CSO: 4010/63

POWER NETWORK

VICE POWER MINISTER ASSURES LHASA OF SUFFICIENT ELECTRICITY

HK310448 Lhasa Xizang Regional Service in Mandarin 1130 GMT 28 Aug 86

[Excerpts] While meeting some cadres of the regional water resources and electric power department on 26 August, Yao Zhenyan, vice minister of water resources and electric power, and (Wang Hai), director of the office of the Xizang economic advisory group of the State Council, said: The investigation group is confident of solving the problem of electric power supply in Lhasa.

On the morning of 26 August, after listening to the report made by Department Director Liu Jiangong in the regional water resources and electric power department on the situation in electric power, Vice Minister Yao Zhenyan and Director (Wang Hai) said: The state Xizang energy comprehensive investigation group has full confidence of solving the problem of electric power supply in Lhasa. Lhasa abounds in water resources.

Vice Minister Yao Zhenyan emphatically said: Development of electric power must be based on local resources and stress meeting urgent needs. To draw a correct conclusion, we must compare all plans for hydropower generation, geothermal power generation, nuclear energy power generation, and gas-turbine power generation.

While talking about the management of the power grid, he said: Lhasa's power grid is small and the load uneven. Management is very difficult. We must stress scientific management. The Ministry of Water Resources and Electric Power is prepared to send another work group to help Lhasa study the problems of its power grid's technological transformation.

In dealing with the prospects for the development of the power industry of Xizang, Vice Minister Yao Zhenyan said with feeling: The Ministry of Water Resources and Electric Power has a duty to support Xizang to develop electricity well. This is the first time that I have come to Xizang. I am willing to come to Xizang for a second and third time. I feel honored that I can devote my energy to the border areas of our motherland and give some suggestions.

Finally, Vice Minister Yao Zhenyan said to the cadres of the regional water resources and electric power department: The central authorities and State Council have attached great importance to the exploitation of Xizang's energy resources. No matter how structural reform is carried out, we cannot promote Xizang's economy without the electric power departments.

/8309
CSO: 4013/3

BRIEFS

SHANDONG 500KV TRANSMISSION LINE--The 500,000-volt ultrahigh-tension power transmission and transforming line from Zouxian County to Weifang City through Jinan, in Shandong, was completed on 20 October. This transmission line is 378 km long and runs through 14 counties and cities. As a key state construction project, this power transmission and transforming line is a support project for the No 2 power generating unit of the Zouxian power plant. It is the first 500,000-volt ultrahigh-tension power line in our province, and is currently the longest in the country. This transmission line used 150 million yuan in investment, and 989 pylons were built along its route. Completed and commissioned, this transmission line ensures a timely supply of power from the Zouxian power plant and plays a very important role in alleviating the strained power supply of our province and in accelerating national economic construction. [Excerpts] [Jinan Shandong Provincial Service in Mandarin 2300 GMT 20 Oct 86] /9604

GEZHOUBA - HUNAN 500KV LINE -- At 0440 hours on the 17th , the Gezhouba-to-Changde power transmission line officially became operational. The Gezhouba hydroelectric power station will now be transmitting from 6 million to 8 million kilowatt-hours of electricity a day into Hunan Province which could have an economic value of more than 20 million yuan. The Gezhouba-to-Changde segment of the line is the first phase of the Gezhouba-Changde-Zhuzhou 500KV ultra-high tension transmission line project, a major project being funded jointly by the Ministry of Water Resources and Electric Power and Hunan Province. The commissioning of this segment of the line will play a major role in easing the tight energy situation in the province. [Excerpts] [Changsha HUNAN RIBAO in Chinese 18 Oct 86 p 1]

JILIN POWER INDUSTRY--Power industrial departments in Jilin Province generated 10.64 billion kWh of electricity from January to August this year, fulfilling the annual target by 80.9 percent and showing an increase of 1.69 billion kWh over the corresponding period of last year. [Excerpt] [Changchun Jilin Provincial Service in Mandarin 0930 GMT 4 Sep 86 SK] /8309

CSO: 4013/3

HYDROPOWER

LONGYANGXIA BEGINS TO IMPOUND WATER

HK150616 Beijing CHINA DAILY in English 15 Oct 86 p 1

[Article by staff reporter Xu Yuanchao]

[Summary] Longyangxia, the highest dam in China, will close its gates today to begin storing water from the [Huang He] for electricity generation.

Much of the 5,464-kilometer river will be dammed up for at least 3 months in order for the Longyangxia to store enough water, the Ministry of Water Resources and Electric Power announced yesterday in Beijing.

The dam and hydropower station, located in the border area between Gonghe and Guinan counties in Qinghai Province, has a reservoir that can store 26.8 billion cubic meters of water, said Ding Yanfang, a ministry official.

The station will have a capacity of 1,280 megawatts, which can generate 6 billion kilowatt-hours of electricity a year. With completion of Longyangxie, four major hydropower stations downstream will be able to produce an additional 540 million kilowatt-hours of electricity per year, Ding told CHINA DAILY in an interview.

She described the Longyangxia as the "Spigot" of a casecade system of 15 hydropower stations on the river.

In the 918-kilometer section between Longyangxia and Qingtongxia, another hydropower station in the Ningxia Hui Autonomous Region, are four major hydropower stations with a total generating capacity of nearly 2,000 megawatts. During the next 3 months, the power stations will have to stop operating because of insufficient water flow.

Construction on Longyangxia started in 1979. The dam, made with 2.7 million cubic meters of concrete, has now reached a height of 140 meters. On completion, the dam will reach 178 meters.

/12624
CSO: 4010/4

HYDROPOWER

WORK ON BILLION-DOLLAR ERTAN TO BEGIN IN 1987

OW270807 Beijing XINHUA in English 0557 GMT 27 Aug 86

[Text] Dukou, 27 Aug (XINHUA)--Sichuan Province will spend 300 million yuan (81 million U.S. dollars) this year preparing to build what will be China's largest hydroelectric power station.

Some of the money will pay for relocating the 20,000 people who live in what will become the station's 100-square-kilometer reservoir, local officials said today. Other funds will pay for designs of highways, railroads, bridges, and power lines required by the station, budgeted to cost 3.7 billion yuan (1 billion dollars).

Located on the Yalong River, 40 kilometers east of the city of Dukou in southwest Sichuan, the station will have a generating capacity of 3 million kilowatts when it is completed.

Construction is scheduled to begin in July 1987, the officials said, and power generation is expected in 1996.

A joint project of Sichuan Province and the central government's Ministry of Water Resources and Electric Power, the station will generate 16.2 billion kilowatt-hours a year--about what the entire province produces now, the official in charge of the project told XINHUA.

"Once the station is going, it will solve Sichuan's energy shortage problem," he said. "The additional energy will allow the economy of southwest Sichuan to grow to its potential."

/8309
CSO: 4010/1

HYDROPOWER

ENGINEERS APPROVE PLAN FOR HUGE 2000 MW LIJIAXIA PROJECT

OW092316 Beijing XINHUA in English 1553 GMT 9 Oct 86

[Text] Xining, 9 October (XINHUA)--A team of government engineers has approved plans for a major hydroelectric power station expected to generate enough energy to meet the needs of northwest China, officials said today.

The 21 engineers said construction of the plant should begin next year on the Lijiaxia gorge on the upper reaches of the Yellow River, the officials said.

The State Council, China's highest governing body, will make the final decision on the project.

Affiliated with the China International Engineering Consulting Corporation, the team conducted feasibility studies of the 2 million kilowatt station, planned for northwest China's Qinghai Province.

Team members said the station, to be built 116 kilometers south of Xining, the provincial capital, will generate 5.9 billion kilowatt-hours a year, enough to meet the needs of northwest China as well as to supply much of north China.

/12232
CSO: 4010/3

HYDROPOWER

AMBITIOUS DEVELOPMENT PLAN FOR HUANG HE BASIN REVIEWED

HK030335 Hong Kong SOUTH CHINA MORNING POST in English 3 Nov 86 p 16

[Article by Yang Xinhe]

[Summary] After 7 years, the Longyangxia project, second in size only to the Gezhouba power station on the Chang Jiang, is nearing completion. It is the fifth to be constructed on the upper Huang He. Ten more are planned.

The western-most dam on the Huang He, Longyangxia started impounding water in late October, and two generating units will produce electricity starting next August. The entire project will be completed in 1989.

This comprehensive water project will generate electricity, provide irrigation, and control the twin menaces of floods and ice flows. To insure a continual flow downstream, water will be stored over a period of 3 years.

The project, involving about 20,000 people and an investment of 2 billion yuan (about HK$4.2 billion), boasts China's highest dam and largest storage capacity. The dam is 178 meters high and capable of holding back 24.7 billion cubic meters of water to create China's biggest artificial lake. It can store 1-year's river flow or one-third of the water of Qinghai Lake, China's largest. Four Chinese-made 320MW turbine generators will produce 6.03 billion kWh annually. Hydro-electric power potential on the upper Huang He is estimated at 13.69 million kilowatts, but only 14 percent of that capacity has so far been realized.

Electric power output in Gansu Province last year reached 14.66 billion kWh. To meet future demands, 19.5 billion kWh will be needed by 1990. "Exploiting water resources on the Huang He is essential," said Mr Jia Zhijie, governor of Gansu Province.

With the addition of 10 more power stations, the Chinese Government expects that electricity capacity will reach 10 to 12 million kW by the year 2000.

Five additional hydro-electric stations will be built between Longyangxia and Liujiaxia in the Laxiwa, Lijia, Gongbo, Jishi, and Sigou gorges. One of the five, the Lijiaxia power station, a key project in the country's Seventh Five-Year Plan, will start taking shape in 1988. It has a design generating capacity of 1.6 million kW and an annual power output of 6 billion kWh.

The newly completed Longyangxia station will actually reduce both construction time and costs at Laxiwa and Lijia gorges because it will provide those sites with flood control. Downstream, the Xiaoxia, Daxia, Wujinxia, Xiaoguanyin, and Daliushu power stations will be built between Bapanxia and Qingtongxia stations already completed.

The exact starting dates of those projects has not been determined. Experts suggest that in addition to government loans, funds from departments, localities, enterprises, and foreign countries need to be raised.

A network of power transmission lines linking the four northwest provinces of Qinghai, Gansu, Shaanxi, and Ningxia has been built. It can deliver power to big and medium-size cities and industrial bases in the region.

Mr Wan Jinwen, the general engineer responsible for surveying and designing hydroelectric stations along the Huang He, said: "By the end of this century, when all 15 power stations on the river are completed, electricity can be assured to the regions and can be transmitted to Beijing and Tianjin. They will also be linked to power grids in central and southern China."

/9604
CSO: 4010/14

SMALL-SCALE HYDROPOWER HELPS SAVE YUNNAN'S FOREST RESOURCES

OW261203 Beijing XINHUA in English 1144 GMT 26 Sep 86

[Text] Kunming, 26 Sep (XINHUA)--The construction of small hydroelectric power stations has helped solve a fuel shortage and balance the ecology in Yunnan Province, southwest China, a local official said here today.

More than 100,000 people in 43 countries, or one-third of the province's counties, are now using electricity for lighting, cooking, and heating. Previously they used mainly wood or straw.

The official said that the amount of logging for personal use by individuals was eight or nine times the amount logged by companies. This has left much of the mountain landscape in this region barren of trees.

To help protect the region's forests, the province has built almost 5,000 small hydroelectric power stations. Now, instead of burning wood, many households use electric power.

The official said the province is also building two larger hydroelectric stations with a generating capacity of 600,000 kilowatts and 1.5 million kilowatts respectively. The stations are expected to supply electricity to all urban and most rural households in Yunnan upon completion.

/9738
CSO: 4010/8

ANALYSIS OF HYDROELECTRIC PROJECT BIDDING

Beijing SHUILI FADIAN [WATER POWER] in Chinese No 5, 12 May 86 pp 45-48

[Article by Zuo Zhaoxi [1563 0340 3556]: "Analysis and Suggestions on Contract Bidding for Hydroelectric Projects"]

[Excerpts] In the early part of the 1950's and 1960's, China built a number of hydropower stations rapidly, with high quality and low construction cost. However, after the 1970's, the construction cost of hydropower projects has gradually risen and construction time has gradually lengthened, and in particular construction cost has dramatically increased in recent years. This situation is due to many causes and is influenced by various subjective and objective factors such as construction conditions, investment allocation, material supply and cost increase of materials and equipment, the capital construction management system, as well as external coordination. But an important factor affecting it is the irrational capital construction management system. Facts have proven that the economic form of self-operation and internal contracts practiced in hydropower capital construction has numerous shortcomings which primarily include: using only administrative means to assign capital construction tasks, over-centralization of state plan; eating out of the "big pot" whereby responsibility, authority, and profits are not unified; construction enterprises (engineering bureaus) lack the conditions for independent operation, and competition among enterprises is absent. Therefore, in order to speed up the development of hydropower, we must reform the capital construction management system. In order to solve this problem, at the same time when diverse forms of the responsibility system of contract for investment on construction projects are practiced in the hydropower system in recent years, we have started to carry out experiments in promoting the contract system of bidding on projects and initial success has been achieved. This article discusses certain circumstances and our initial understanding of this problem.

I. Experiments in Carrying Out the Contract System of Bidding

1. International bidding on the diversion system project of the Lubuge hydropower station

This power station is located on the Huangni He on the Yunnan-Guizhou border and has an installed capacity of 600,000 kW. A World Bank loan was used for its power system project put up for international bidding. Through competitive

bidding, Taisei Corporation of Japan won the bid. The principal construction projects of this bidding include a power tunnel with a diameter of 8 meters and a length of 8,782.2 meters; a pressure regulating well with a diameter of 13 meters and a depth of 68.5 meters and two inclined penstocks with a diameter of 4.6 meters and a total length of 891.7 meters; and four high-pressure branches. The total project includes 119,800 cubic meters of excavation, 50,000 meters of anchor rods, 44,500 cubic meters of shotcrete,20 tons of steel supports, 11,200 meters of drain holes, 48,000 meters of consolidation grouting, 2,870 tons of steel reinforcement manufactured and installed, 2,940 tons of penstocks manufactured and shipped, 2,570 tons of penstocks installed, 50.9 tons in the manufacturing of two branch pipes and manufacturing and installation of metallic structures. Invitations for bids on this project were sent to 17 foreign and three domestic contractors by the Ministry of Water Resources and Electric Power. Eighteen responded, of which seven submitted bids. The disclosure of the bids was formally held on 8 November 1983. Through evaluation, Taisei Corporation of Japan was awarded the contract for having the lowest bid and a construction schedule of 1,597 days. This corporation moved into the work site in August and September of 1984, and work on the various construction tasks began in October.

2. Domestic bidding of Shitang hydropower station

This power station is located on the Ou Jiang in Zhejiang, 25 kilometers downstream from Jinshuitan hydropower station. It is a riverbed runoff power station with an installed capacity of 78,000 kW. It has a 5-hole overflow dam, a riverbed plant building, a retaining dam section, a 110-kV switching station and navigation and log passing structures. The state required the work to begin on 1 July 1985, the first generating unit to formally generate power on 31 December 1988, construction to be completed by 30 June 1989, and that effort be made to do so ahead of schedule. In order to lower construction cost, shorten construction time, and reform the project construction management system, the Ministry of Water Resources and Electric Power decided to bid out the construction of this power station by individual projects and phases and optimize the selection of contract units for civil engineering construction, equipment manufacturing and installation. Bidding on the various projects are set forth below:

(1) Bidding on civil engineering projects. The principal project volume to be contracted out include 391,800 cubic meters of earth-rock excavation, 270,300 cubic meters of concrete and reinforced concrete, installation of 2,302 tons of metal structures and built-in fittings, as well as constructing one diversion project. Unit price contracts were used for the principal part of the project while a fixed total price contract was used for the construction of the diversion project. After the call for bids was made to various construction enterprises in the country, 26 responded, 10 of which submitted their application for preliminary verification of their qualification to bid. After preliminary verification of their qualification, nine enterprises were found qualified and eight of them purchased bid and contract documents. With the exception of one enterprise which did not submit a bid, the other seven prepared their bid documents in a relative short time and submitted them on schedule. The proprietor disclosed the bids in Hangzhou on 20 November, 1984. The bid documents of six enterprises met the requirements and three of them

were eliminated as a result of preliminary evaluation, and the bid documents of the other three underwent clarification and final evaluation. Ultimately, No. 12 Engineering Bureau of the Ministry of Water Resources and Electric Power won with the lowest bid and the contract was formally signed on 11 February 1985.

(2) Bidding on the manufacturing of water-turbine generating equipment. Bid appraisal contract was used by which two enterprises were invited to submit separate bids, and after a joint appraisal through discussion between the proprietor and contract assignment unit, the Hangzhou Power Generating Equipment Plant was finally selected to be the contractor for the manufacturing of three water-turbine generating units of that power station, and the economic contract for the manufacturing of three 26,000-kW water-turbine generating units was signed on 15 March 1985.

(3) Bidding on the manufacturing of metal structures. Fixed total price contract and invitation for bids were used. Six enterprises participated in the bidding, five bid documents were received (two enterprises made a joint bid) and the bids were disclosed in Hangzhou on 31 May 1985. The bidding on this project is under review. It is expected that either Zhengzhou Hydraulic Plant or Sanmenxia Hydraulic Plant will win the bid. The bids from both enterprises are lower than the base.

(4) Bidding on the highway re-routing project. The re-routed highway is 4.1 kilometers in length. Open bidding for inside the province was used and fixed total price contract was adopted. A total of eight enterprises made bids as invited. After evaluation, it was decided that the one with the lowest bid won.

(5) Bidding on the installation of generating units. This task was still being carried out at the time this article was written.

3. Bidding on the earth-rock excavation project on the left bank of Yantan Hydropower Station

This power station is located on the Hongshui He in Guangxi, and the layout is composed of a 525-meter concrete gravity dam (of which the overflow dam section is 159.35 meters), a toe-of-dam plant building and ship lift as well as one outlet and one scour vent. Its total installed capacity is 1.5 million kW. Its construction diversion uses the bottom outlets of the left-bank open channel and dam notch for diversion. This power station also bids out contracts for construction by projects and phases. The volume of the left-bank earth and rock excavation project is: 579,400 cubic meters of earth open-cut, 1,769,910 cubic meters of rock open-cut, 20,000 meters of rock anchors and 10,000 cubic meters of concrete slope protection. After the bidding was announced, six enterprises made bids as invited, and they were disclosed in Nanning on 3 December 1984. After evaluation, the Gezhouba engineering bureau won with the lowest bid. In accordance to contract stipulations, this engineering bureau has already begun construction at the work site.

4. Bidding on the construction of the diversion project at the Caopo hydropower station in Sichuan

Caopo hydropower station is located in Wenxian County of Aba Autonomous Prefecture in Sichuan. It generates power by using the runoff from the Caopo He, which is a tributary of the Min Jiang, has a design water head of 392 meters, a diverted flow of 11 cubic meters per second, an installed capacity of 2 x 15,000 kW or a total of 30,000 kW. The autonomous prefecture handles all construction affairs. Bidding was based on construction phases and the 2,810.5-meter-long diversion tunnel is the biggest construction task of the power station put out for bidding. Bid invitations were sent to eight construction enterprises in November 1984, seven of which submitted their bid documents on time. The bids were disclosed on December 18 of the same year. The bids from five enterprises were lower than the base. The highest bid was 115 percent of the base while the lowest was 90 percent. The engineering department of the Chengdu Railway Bureau won with the second lowest bid, which was 5,283,000 yuan or 5 percent lower than the base; construction time was reduced by 2 months. The contract was appraised on 10 Jaunary 1985.

II. Preliminary Analysis of Economic Benefits

The adoption of the contract system of bidding for constructing hydropower stations will inevitably bring about reform of the internal management system of enterprises because bidders must compete with one another. It is evident from their bids that there is great disparity among the bids from various enterprises and competition is intense.

It is worth noting that all the lowest and second lowest bids are below the base amounts, which are in turn lower than the budgetary estimates. As a result of bidding, construction costs of the various projects are reduced, their construction time shortened and economic benefits are notable. For example: (1) For the construction of the diversion system of Lubuge hydropower station, Japan's Taisei Corporation won with the bid of 84,630,000 yuan and a construction time of 1,597 days, reducing by nearly a third in investment compared to the conventional way in which the construction task was handed down by administrative order to the No. 14 Engineering Bureau of the Ministry of Water Resources and Electric Power, and construction time has also been shortened. After Taisei moved in to begin construction, a monthly drilling of 271.9 meters was achieved in tunnel excavation, and it appears that construction time may be further shortened. (2) The preliminary design of Shitang hydropower station was completed in 1983 at a budgeted total investment of 177.5 million yuan which was increased to 184 million yuan after it was examined and discussed. Later, as a result of analysis on the reasons for increasing the investment and further optimizing the design, the investment was reduced to 140 million yuan. The Ministry of Water Resources and Electric Power decided to make this project experimental and called for bids on the contract. It also requested the East China Survey and Design Institute to form the East China Hydropower Consulting Corporation to undertake the contract for constructing the Shitang hydropower station based on a total investment of 140,000,000 yuan. So far, the East China Hydropower Consulting Corporation has successfully completed the bidding on four projects which achieved relatively good results, most notable of which is the bidding on the

civil engineering project. Since investment on that project make up about 50 percent of the total budgeted and is the largest project bidded on and the bidding price of 53,430,000 yuan signed by contract, the construction cost of this project was reduced from the revised budgetary estimate by 25 percent and the peak labor force reduced by 42 percent. Moreover, construction can be completed three months ahead of schedule. Bidding on other individual projects has also reduced construction cost. The manufacturing cost of the main generating equipment was reduced by 10 percent, that of metal structures is expected to be lowered by about 12 to 17 percent, and the winning bid for the highway re-routing project is about 40 percent less than the budgetary estimate. (3) Judging from the bidding of the Yantan and Caopo projects, winning bids are lower than base cost and are even lower than the budgeted investment. It is evident from the above that reform of the capital construction system of hydropower projects is indeed very significant to the lowering of construction cost and shortening of construction time.

III. Some Initial Understanding and Suggestions

1. The fact that tangible economic results are achieved by contract bidding teaches us that reform of the capital construction system of hydropower is a task which demands immediate attention and is an important way to speed up hydropower construction. Initial practice has proved that the investment on all construction projects that are contracted out by bidding can be controlled within budget; but for those projects which have not been contracted by bidding (such as population displacement by reservoirs and land acquisition), it is very difficult to keep expenditure within budget.

2. In the bidding process, bidding units should earnestly study the design and budgetary estimates drawn up by design units, adhere to careful calculation and strict budgeting, contribute to the lowering of hydropower construction cost and shortening construction time by promoting contractors to continuously improve their technical standards and construction quality, improve construction management and being particular about economic results.

3. The practice of the contract system of bidding for the construction of hydropower projects is the orientation of reforming hydropower capital construction system, but some issues such as construction funds, equipment and material supply must be correspondingly resolved according to the contract period, otherwise it will be difficult to ensure success of this reform task. Moreover, currently it is impossible to practice contract bidding on reservoir population displacement and land acquisition projects, and if we do not adopt effective measures it will be very difficult to control this part of the expenses within budget. Therefore, we suggest that prior to approving and listing a project among those to begin construction, the State Capital Construction Commission should first sign a contract with the local government. This will better mobilize the enthusiasm of local governments.

4. In order to improve the enthusiasm of bidders, for those who conform to the requirements of bid documents, if their bids are close to or lower than the base, even though they do not win the bids the contract assigner should provide certain expense subsidies depending on their distances from the work site. Without the enthusiasm of bidders, even active promotion of the contract system of bidding will run into difficulties. For example, the bidding

on installing electromechanical equipment at the Shanghai Shidongkou thermal power plant and the Shitang hydropower station fell short of the ideal. The former had only one bidder and the latter had two, one of which cancelled, resulting in the loss of enthusiasm among contractors and creating difficulties and unfavorable situations. It is hoped that this problem will arouse the attention of leaders concerned; and it seems necessary that explicit stipulations are made on bid invitations.

5. In order to further shorten hydropower construction time and reduce construction cost, bidding on the design of hydropower stations is necessary. Particularly for the design of large or super-large hydropower stations involving big investment and long construction schedules, developing competition on design will definitely yield even better results. It is also hoped that leading departments concerned will stipulate this in explicit terms.

9586/5915
CSO: 4013/135

PROBLEMS OF GENERAL SURVEY OF SMALL-SCALE HYDROPOWER RESOURCES

Beijing SHUILI FADIAN [WATER POWER] in Chinese No 5, 12 May 86 pp 50-51, 27

[Article by Li Xianbing [2621 0341 3521] and Xu Jianhua [1776 0494 5478]:
"An Inquiry Into Some Problems Concerning General Survey of Small Hydropower Resources in China"]

[Text] After the founding of the state small-scale hydropower in China developed rapidly. By 1983 there were more than 93,000 small hydropower stations throughout the country with an installed capacity of over 8.5 million kW (about one-third of the total hydropower installed capacity in China) and an annual output of some 20 billion kWh of electricity (about one-third of rural consumption). In recent years, China has annually increased its installed capacity of small-scale hydropower by around 1 million kW. Guangdong, where small-scale hydropower has developed rapidly, has an installed capacity of 1.41 million kW, ranking it first in the country. Although small-scale hydropower plays a considerable role in the development of China's township and rural economy, we have no reliable figures on China's small hydropower resources. Some say that China has a potential of 150 million kW in small hydropower resources, of which 70 million kW are exploitable; while others say that we have 60 million kW, of which only 20 million kW are exploitable. The two are quite far apart and this concerns the problem of criteria used in calculating small hydropower resources. Small hydropower is a component of the entire hydropower development plan, and the way to unify criteria and obtain relatively accurate and universally recognized figures through general surveys are highly important to doing a better job to develop China's small hydropower in the future. We took part in the national survey of hydropower resources in 1977-1979 and learned something from it. Here we will explore the following problems, providing a source of reference for comrades concerned.

1. Theoretical hydropower potential of small and medium-sized rivers should be used as the theoretical potential of small hydropower

It is generally known that "exploitable capacity" of small hydropower refers to the installed capacity of small hydropower stations that have been constructed, are being constructed, or may be constructed on rivers. Generally speaking, most small hydropower stations are built on small and medium-sized rivers and they may also be built on certain large rivers. Similarly medium-sized or larger hydropower stations may be built on certain small and medium-sized rivers. For instance, the Tuo Jiang in Sichuan has a drainage area of

27,860 square kilometers with a mean annual flow of 519 cubic meters per second, a trunk stream 702 kilometers long and 1,526,400 kW in theoretical hydropower potential, which is generally regarded as a large river. But as it is limited by topography, inundation and other factors, 16 of the 19 cascades in the planning of the trunk stream are small hydropower stations under 12,000 kW and only 3 have installed capacity of 12,500, 15,000, and 16,000 kW. Another example is the He Jiang in Guangxi, which has a drainage area of 7,030 square kilometers, a mean annual flow of 240 cubic meters per second, a trunk river of 186 kilometers in length, and a theoretical hydropower potential of 242,000 kW, which is generally regarded as a small river. Of the 17 cascades along the river, with the exception of the 68,000-kW Hemiansi hydropower station which is a medium-sized, the other 16 are all small stations under 12,000 kW. Evidently, the exploitable capacity of small hydropower differentiated in terms of installed capacity as stipulated by the state can be calculated by individual rivers. The theoretical energy potential of small hydropower will be difficult to calculate without suitable specifications. We understood this when we took part in the water resources survey of the Chang Jiang basin in 1977-1979, and at that time, large, medium-sized and small hydropower potential had not been differentiated.

In light of tabulation by categories of hydropower resources in recent years by some provinces (and regions) in China, it is appropriate to treat the theoretical hydropower potential of small and medium-sized rivers as the theoretical potential of small hydropower. The question is, what kind of rivers can be considered small or medium-sized? Judging by sources outside China, the criteria used by different countries to differentiate small and medium-sized rivers vary. Even in the same country, specifications may vary at different times. For example, in the early days the Soviet Union stipulated that the total hydropower potential of small rivers must not exceed 1,700 kW in plains areas and 2,000 kW in mountainous areas. When the Soviet Union formulated its plan for small rivers in the 1960's, rivers that were 10 to 100 kilometers long with a mean flow of 5 to 50 cubic meters per second at their mouths were classified as small; those which were 100 to 500 kilometers long with a flow of 50 to 500 cubic meters per second were classified as medium-sized. On this basis, it has been calculated that the theoretical hydropower potential of small and medium-sized rivers is 108 million kW with an exploitable capacity of 13 million kW, which respectively make up 40 percent of the theoretical hydropower potential and 7.3 percent of the exploitable capacity in the Soviet Union.

There are still no definite provisions in China to differentiate small and medium-sized rivers. In the 1950's, rivers with a drainage area of 100 to 10,000 square kilometers were regarded as small or medium-sized. In the early 1980's some provinces defined a river as medium-sized if it possessed one of the following conditions: drainage area equal to or larger than 1,000 but less than 5,000 square kilometers; theoretical potential of river equal to or greater than 25,000 but less than 250,000 kilowatts; river's mean annual runoff equal to or greater than 500 million cubic meters but less than 3.5 billion cubic meters; and length of river equal to or greater than 75 but less than 200 kilometers. Rivers lacking any of these conditions are considered small. Recently, there has been another suggestion to define small rivers as those less than 100,000 square kilometers in length and less than 100,000

square kilometers in drainage area. By this criterion, in the Chang Jiang basin, with the exception of the main stream, only the four tributaries of Yalong Jiang, Min Jiang, Jialing Jiang, and Han Jiang may be called large. All other tributaries are classified as either small or medium-sized. It seems that the latter criterion to define small and medium-sized rivers is on the high side.

Since China is vast in territory, not only do natural conditions of rivers in the north and the south vary greatly, but the upstream, midstream and downstream tributaries of each large river system also vary a lot. In the upper and lower Chang Jiang basin, tributaries which are basically similar in drainage area, mean annual flow, and length frequently differ several times in hydropower potential simply because of different natural drops. For example, the Liuchong He, which is a tributary of the Wu Jiang on the upper Chang Jiang, is basically similar to the downstream Shuiyang Jiang in drainage area, mean annual flow and length, but the former has a hydropower potential of 477,600 kW while the latter has 73,600 kW, or a six-fold difference. Both of these rivers have small hydropower stations as well as medium-sized or larger ones. Therefore, merely using the drainage area and length of a river to differentiate large, medium-sized, and small rivers cannot reflect the size of a river's hydropower potential. It is more appropriate to judge the size of a river by finding the product from multiplying the two main parameters of flow and natural drop according to a definite correlation (that is, a river's theoretical hydropower output or the theoretical hydropower potential) and then combining it with the distribution of various types of hydropower stations on the river.

After a comprehensive analysis of the natural conditions of the various tributaries of the Chang Jiang basin, we believe that it is feasible to use a definite quantitative level of theoretical potential as the limit for tabulating small and medium-sized rivers, in other words, classifying rivers with less than a certain quantity of theoretical potential as small and medium-sized, and use their theoretical potential as the theoretical hydropower potential of small hydropower. In the Chang Jiang basin, rivers with a theoretical hydropower potential under 300,000 kW can be generally regarded as small and medium-sized. This will be elaborated in the latter part of this article.

2. It is more appropriate to set the upper limit of the criterion for differentiating small hydropower stations at 25,000 kW.

The criteria for differentiating small hydropower stations vary a great deal from country to country. Even in the same country criteria vary at different times. Generally, corresponding technical economic policies are drawn up and the criteria for differentiating various hydropower stations are set by each country on the basis of the size of its potential in hydropower resources, its level of development and utilization (including the capacity and extent of development and utilization), and conditions of supply and demand of energy in the state.

Some countries regard individual hydropower stations with an installed capacity between 5,000 and 30,000 kW as small, which are generally set at 15,000 kW. The Soviet Union has set the upper limit of installed capacity of small hydropower stations at 30,000 kW. The United States has only recently set it at 15,000 kW or under and classified those under 1,500 kW as tiny. France has

defined hydropower stations between 2,000 and 10,000 kW as small, those between 500 and 1,000 kW as very small, and those under 500 kW as mini. In Japan, the capacity of small hydropower stations is between 300 and 10,000 kW. Some countries in Asia and Africa set small hydropower stations as either under 1,000 kW or under 5,000 kW. The several international conferences on small hydropower held in recent years regard stations under 1,000 kW or between 1,001 and 12,000 as small. Abundant in hydropower resources, Brazil in South America has tabulated hydropower stations throughout the country by region according to installed capacity in three categories: under 40,000 kW, between 40,000 and 400,000 kW, and above 400,000 kW. Evidently, criteria vary greatly from country to country.

The criteria for differentiating small hydropower stations in China gradually increased in scale along with the development of the hydropower undertaking. In the 1950's, small hydropower stations referred to those with a single-station installed capacity under 500 kW. In the 1960's, they referred to single-station installed capacity under 3,000 kW. Since the 1970's, this has been increased to single-unit installed capacity under 6,000 kW and single-station installed capacity under 12,000 kW. In September 1978 the Ministry of Water Resources and Electric Power issued the "Grading and design standards of key water conservancy and hydropower projects (section on mountainous and hilly areas)" (SDJ12-78) (hereafter abbreviated as "Ministry-issued standards"), which classifies project grades and sizes according to the four targets of total storage, flood prevention, irrigated area, and installed capacity of hydropower stations. Specifications include: those with an installed capacity of 500 to 25,000 kW are small Type I stations, and those under 500 kW are small Type II stations. Although this criterion was drawn up for the design of key water conservancy projects, it is also the basis for differentiating small, medium-sized, and large hydropower stations. In recent years, in tabulating their exploitable small hydropower capacity, many provinces (and regions) have raised the upper limit to 25,000 kW to maintain consistency with the "Ministry-issued standards". For example, Guizhou figured that its small hydropower under 25,000 kW has an exploitable capacity of 2,000,000 kW, Sichuan has 5,100,000 kW, Hunan 2,430,000 kW, and Qinghai 1,010,000 kW. It is evident from the above that rational determination of the criterion for differentiating China's small hydropower stations and correct tabulation of the national exploitable small hydropower capacity are closely related to the development of hydropower in China step by step in a planned way. This is a task in an important technical and policy issue. If the criterion for differentiating small hydropower stations is set too low, not only will it fail to reflect China's actual exploitable small hydropower capacity but it will be unfavorable to the development of hydropower. If it is set too high (as someone has suggested using 100,000 kW as the upper limit of small hydropower stations), it will encounter difficulties during implementation particularly for the prefectural and county level at least in raising and allocating funds. In view of the current state of small hydropower development in China, it is more appropriate to set the upper limit of small hydropower installed capacity at 25,000 kW based on the "Ministry-issued standards".

3. Preliminary estimates of exploitable small hydropower capacity and theoretical potential of small and medium-sized rivers in the Chang Jiang basin

In the third nationwide survey on hydropower resources during 1977-1979, a total of 1,090 rivers were surveyed in the Chang Jiang basin whose theoretical potential was 256 million kW and exploitable capacity was 195 million kW. Adding the incomplete figures for rivers and power stations under 10,000 kW, the theoretical potential of the entire river basin totals 268 million kW and the exploitable capacity 197 million kW.

It should be pointed out that 588 of the 1,090 rivers in the Chang Jiang basin surveyed have been completely or partially laid out with cascade hydropower stations, and 432 small rivers have yet to be arranged with power stations since only their theoretical potential has been computed. Therefore the exploitable capacity of the river basin as a whole will increase in the future.

We have tried the method described above in a comprehensive analysis on the natural conditions of the tributaries in the river basin and have made preliminary estimates of the theoretical potential of small and medium-sized rivers and the exploitable capacity of small hydropower stations in the river basin. In other words, we have tabulated the theoretical potential of small and medium-sized rivers throughout the river basin by categories of under 100,000 kW, under 200,000 kW, under 300,000 kW and under 400,000 kW. We have also tabulated the exploitable capacity of single stations with an installed capacity ranging from 500 to 25,000 kW. The results of tabulation are as follows: There are 3,956 I hydropower stations of 500 to 25,000 kW with an installed capacity of 12,950,000 kW which makes up 6.6 percent of the total exploitable capacity of the river basin. If we include Type II small hydropower stations under 500 kW, the exploitable small hydropower capacity will be at least 15 million kW. The theoretical potential of small and medium-sized rivers based on the two criteria of under 200,000 kW and under 300,000 kW are 52,460,000 kW and 60,220,000 kW, which respectively makes up 19.6 and 22.5 percent of the total in the river basin. In other words, the hydropower potential of small hydropower makes up about one-fifth of the total in the Chang Jiang basin.

As for how to determine which rivers are to be tabulated as small and medium-sized, we will need to make concrete analysis. As discussed above, small and medium-sized rivers have small hydropower stations and may have medium-sized and larger ones; large rivers may also have small stations. When treating rivers with a capacity under 300,000 kW as small and medium-sized, then the exploitable capacity of small stations makes up about 80 percent of the total in the river basin. In other words, the absolute majority of small stations is distributed on rivers under 300,000 kW. According to statistics, the total capacity of medium-sized and larger stations in the Chang Jiang basin is 185,000,000 kW while those under 300,000 kW total 6,480,000 kW, which makes up a mere 3.5 percent of the total installed capacity of medium-sized and larger stations in the Chang Jiang basin. Evidently, it is feasible to use rivers with a potential under 300,000 kW as a limit for tabulating the hydropower potential of small and medium-sized rivers in the Chang Jiang basin.

In short, it is a strategically important task for us to gain a firm understanding of China's small hydropower potential and exploitable capacity without delay and develop step by step with planning those small hydropower projects which are small in project volume, low in investment, quick to yield benefits and good in economic results. We suggest that under the leadership of the Water Conservancy and Hydropower Construction Bureau and the Rural Electricity Department of the Ministry of Water Resources and Electric Power, prompt efforts be made to conduct research, draw up plans, mobilize agencies in the river basin and the water conservancy and hydropower departments of various provinces and cities (and districts) to supplement the survey, make survey reports on small hydropower resources by provinces and water basins, and conduct a nationwide summary. This task is not difficult to accomplish.

9586/5915
CSO: 4013/135

GROUNDWORK BEING LAID FOR HUGE JINSHA JIANG PROJECT

HK121431 Hong Kong ZHONGGUO XINWEN SHE in Chinese 1409 GMT 10 Nov 86

[Text] Chengdu, 10 Nov (ZHONGGUO XINWEN SHE)--China will build a large hydroelectric power station with an installed capacity ranging from 3.6 million kilowatts to 4 million kilowatts at Xiangjia dam in the lower reaches of the Jinsha Jiang. Preparations for the initial stage of the construction have begun.

Jinsha Jiang, the mainstream on the upper reaches of Chang Jiang, ranges from Qinghai's Yushu to Sichuan's Yibin and has an overall length of over 2,300 km. The Jinsha Jiang is one of the Chinese rivers that are most abundant in water resources and that have the greatest exploitable potential.

According to surveys made over a number of years in the past, the lower reaches of Jinsha Jiang have an average flow capacity of over 4,400 cubic meters per second; the volume of water in the lower reaches of Jinsha Jiang is relatively stable; and there are many high mountains and narrow valleys on the two banks of the river, thus constituting an ideal site for building a large hydroelectric power station.

After the completion of this large hydroelectric power facility, whose installed capacity will exceed Gezhouba's by 900,000 kilowatts to 1.3 million kilowatts, the station not only will be able to satisfy the electric power consumption needs of Sichuan Province but will also be able to transmit its electricity to central and east China.

/9604
CSO: 4013/15

BRIEFS

ANOTHER GEZHOUBA UNIT OPERATIONAL--Hankou, 29 Sep (XINHUA)--A new 125,000-kilowatt power generator went on line Saturday at the Gezhouba Hydroelectric Dam on the [Chang Jiang] in Hubei Province, energy officials said today. The unit is the third to be added this year to the dam's Dajiang Power Station, which now has a generating capacity of 375,000 kilowatts. Overall, the Gezhouba Hydroelectric Engineering complex leads the country in power plant expansion, the officials said. It has built ten generating units since its first in 1981 which so far have produced more than 30 billion kilowatt-hours. [Text] [Beijing XINHUA in English 0703 GMT 29 Sep 86 OW] /6662

1987 WILL BE RECORD YEAR--Beijing, 25 Oct (XINHUA)--Hydropower generating units with a combined capacity of 1.9 million kW will go into operation across China in 1987, more than in any previous year since new China was founded in 1949. The Gezhouba Hydroelectric Power Station on the [Chang Jiang] will install five units with a total capacity of 625,000 kW and the Longyang Gorge Station on the [Huang He] will have two units with a combined capacity of 640,000 kW. [Text] [Beijing XINHUA in English 1457 GMT 25 Oct 86] /9604

GUANGDONG SMALL-SCALE HYDROPOWER--According to the provincial conference on irrigation and hydroelectricity generation, held in Zhongshan City, the province scored great achievements in building small hydroelectric power stations. The province now has more than 14,000 small stations with an annual power generation output of 4.35 million kWh, accounting for 48 percent of the province's hydropower output. Connecting with the large power networks, these stations supply power to 98 percent of the province's townships, 86 percent of the province's peasant households. The coverage of the power network ranks top in China. During the past 5 years, the province built many small hydroelectric power stations with a total installed capacity of over 500,000 kilowatts. [Summary] [Guangzhou Guangdong Provincial Service in Mandarin 0400 GMT 23 Sep 86 HK] /7358

CSO: 4013/5

TWENTY PIT-MOUTH PLANTS UNDER CONSTRUCTION

OW291003 Beijing XINHUA in English 0910 GMT 29 Sep 86

[Text] Beijing, 29 Sep (XINHUA)--China is continuing to pursue its new strategy for coal-fired power plants--building them next to coal mines.

"It's cheaper to move electricity than to move coal, and it provides a handy way to use low quality coal," an official from the coal ministry said today, explaining the benefits of the strategy.

In line with the plan, the country has built 20 major coal-fired power plants with a total generating capacity of 10 million kilowatts adjacent to mines, and 20 more are under construction, the official said.

If built far from a mine site, he said, six of the larger plants alone would have required 600,000 railroad cars to meet their total annual needs of 30 million tons of coal.

Plants near coal mines are being built in Inner Mongolia as well as in Anhui, Guizhou, Henan, Shaanxi, Shandong, and Shanxi provinces, according to the official.

China has verified coal reserves of 783 billion tons, more than any country in the world aside from the Soviet Union and the United States.

/7358
CSO: 4010/2

TWENTY-FIVE COASTAL POWER PLANTS PLANNED

Guangdong GUANGZHOU RIBAO in Chinese 2 Oct 86 p 1

[Article: "Twenty-Five Power Plants To Be Built in 'Seventh Five-Year Plan'; Total Installed Capacity To Reach 14.4 Million Kilowatts"]

[Text] During the Seventh Five-Year Plan, China will build 25 power plants along the coast in open cities and special economic zones. These plants will have a total installed capacity of 14.4 million kilowatts, or one-fourth of all installed capacity planned for the Seventh Five-Year Plan.

The open coastal cities and special economic zones along the coast are rather well developed and will play a major role in the country's economic take-off in the 1990's. Today, however, these open cities and special economic zones have an installed capacity of only 7.9 million kilowatts and the power supply situation is very strained. In order to improve this situation and enhance the economic climate, the state is making use of both local and foreign investment to accelerate power construction in these areas.

New construction or expansion projects are in Dalian, Tianjin, Yantai, Qingdao, Lianyungang, Nantong, Shanghai, Ningbo, Fuzhou, Guangzhou, and Wenzhou. Among them are the Dalian power plant, the Jixian power plant, the Huangdao power plant, the Xinhai power plant, the Nantong power plant, the Shanghai Shidongkou power plant, the Zhejiang Beilungang power plant, the Fuzhou power plant and the Shatoujiao power plant.

CSO: 4013/20-P

FIRST-PHASE ZOUXIAN POWER PLANT PROJECT JOINS GRID

SK250347 Jinan Shandong Provincial Service in Mandarin 2300 GMT 24 Oct 86

[Excerpts] On the afternoon of 24 October, the second 300,000-kW turbo-generator of the Zouxian power plant, which was incorporated into the 1986 national plan, began to feed power into the grid after successfully passing a 72-hour test operation. The first phase of the Zouxian power plant project was completed 8 months ahead of schedule, and was appraised as a project of first-class quality and built with the highest efficiency in the history of China's power construction.

The first-phase project of the Zouxian power plant was undertaken and installed by the First Shandong Power Industry Construction Company. During the construction period, this project attracted the attention of the Party Central Committee, the State Council, the Shandong Provincial Party Committee and the Shandong Provincial People's Government. Thanks to the great efforts of the workers and staff members of the First Shandong Power Industrial Construction Company, the first-phase project of the Zouxian Power Plant was built with first-class quality and the highest efficiency in the country. With great effort the workers and staff members of the company performed a miracle for the country in building the first generating unit, and were thus named as a nationally advanced collective by the All-China Federation of Trade Unions. The second generating unit was completed in 4 months less time than that required for the first generating unit. Only 7 months were used from the installation of boilers to the beginning of operation. All the technical targets of the second generating unit have reached the national good level.

/9604
CSO: 4013/13

THERMAL POWER

WORK ON 2400MW SHANG'AN PLANT NOW UNDER WAY

OW041830 Beijing XINHUA in English 1648 GMT 4 Oct 86

[Text] Shijiazhuang, 4 Oct (XINHUA)--Construction began today on a coal-fired power plant designed to eventually have a generating capacity of 2.4 million kW in Jiangxing County, Hebei Province.

The Shang'an power plant, a national key construction project for the Seventh Five-Year Plan (1986-1990), will be built in three stages, according to a project official.

The first stage, to be completed by 1988, calls for installing two 350,000-kW generating units provided by a foreign business group consisting of the U.S. General Electric, B and W of Canada and Ansaldo of Italy.

The group also offers technical services and designing, and supplies construction materials, the official said.

The plant, the first major power plant in Hebei using foreign equipment and capital, is 70 kilometers to the east of Yangquan, a major coal mining city in Shanxi Province.

/6662
CSO: 4010/6

THERMAL POWER

PLANTS BEING BUILT NEAR GUANGZHOU

OW060842 Beijing XINHUA in English 0822 GMT 6 Oct 86

[Text] Guangzhou, 6 Oct (XINHUA)--Two thermal power plants are being built on the outskirts of Guangzhou, capital of Guangdong Province, to ease its severe electricity shortage.

With projected generating capacities of 1.2 million kilowatts and 700,000 kilowatts, the two plants are located on the Humen, a major battle field during the Opium War (Britain's invasion of China, 1840-1842), an official in charge of the project's constuction said here today.

The plants are listed as state key projects to be built in the 1986-90 planning period.

Phase-one construction of one plant involves installing three 200,000-kilowatt generating units within a year with overall completion expected by 1993.

The second plant, to be powered by two imported generating units, is a joint project of the Shenzhen Special Economic Zone and Hopewell Power (China) Limited of Hong Kong. Total investment for the project is four billion Hong Kong dollars (513 million U.S. dollars).

One unit, with a generating capacity of 350,000 kilowatts, will go into operation next June and the other in October of the same year.

/6662
CSO: 4010/6

THERMAL POWER

SHANGHAI TO GET 1200 MW PLANT

OW241142 Beijing XINHUA in English 1119 GMT 24 Aug 86

[Text] Shanghai, 24 Aug (XINHUA)--China will import an electric power plant with a 1.2 million kilowatt capacity for Shanghai in order to fight an expected shortage of power, a local official said today.

To be built in Shidongkou, the plant will supply more than 7 billion kilowatt-hours of electricity a year to China's leading industrial city after 1991, and it is the largest imported power project approved by the State Council, he said.

By then, Shidongkou will be one of China's largest power centers with 2.4 million kilowatts in generator capacity. The plant's two generating units, each with a capacity of 600,000 kilowatts, will also be among China's largest, said the official.

Shanghai is estimated to suffer a shortage of a total of 9 billion kilowatt-hours in the next 3 years.

The project is a joint venture between the city and the Huaneng International Power Development Corporation.

/8309
CSO: 4010/1

JIANGSU BEGINS WORK ON 700 MW NANTONG PLANT

OW090139 Beijing XINHUA in English 1232 GMT 8 Oct 86

[Text] Nanjing, 8 October (XINHUA)--Jiangsu Province in east China today began construction of a power plant with a generating capacity of 700,000 kW in Nantong City, the province's leading [Chang Jiang] port.

The plant is one of the country's key energy construction projects during the Seventh 5-Year Plan (1986-1990).

It will involve an investment of 1.25 billion yuan (337 million U.S. dollars) and is expected to be put into operation by 1989. Then, the plant will provide more than 5 billion kWh of electricity a year, a project official told XINHUA today.

Foreign capital will also be used for the construction of the plant, the official said.

/12232
CSO: 4010/3

HARBIN BOILER WORKS TURNS OUT BOILER FOR 600MW GENERATOR

Beijing JINGJI RIBAO in Chinese 4 Oct 86 p 2

[Text] Manufactured with imported technology, China's first boiler for a 600,000-kilowatt steam turbine was completed on 27 September at the Harbin Boiler Works. This is the largest jumbo power generator boiler ever manufactured in China and has the largest volume and highest parameters; its development shows that China's boiler design and manufacturing standards have reached world levels.

The research and development of a boiler for a 600,000-kilowatt power plant was listed among 12 priority items of technical equipment by the State Council for the fifth and sixth 5-year plans. The boiler's net weight is 1,500 tons and it stands 87 meters high. The entire boiler assembly consists of 217 components, with nine components being imported from abroad and the remaining 208 being manufactured in China. According to some sources, this 600-megawatt unit costs 20 percent less and takes some 7000 fewer hours a year to operate than three 300-megawatt units; one boiler for a 600MW facility can save 200,000 tons of standard coal a year compared to three boilers for 300MW facilities.

This boiler has already been transported by land to the Pingxu power plant in Anhui Province where it will be installed.

/7358
CSO: 4013/9

BRIEFS

WORK ON FUZHOU PLANT BEGINS--Fuzhou, 1 Sep (XINHUA)--Construction began today on the Fuzhou coal-fired power plant, one of the main construction projects of China's Seventh Five-Year Plan (1986-1990). The plant, expected to have a generating capacity of 1.4 million kilowatts when it begins operating in 1989, is located where Fujian Province's main river, the Minjiang, meets the Taiwan Straits. The first phase of the project includes installation of two Japanese generators with a combined capacity of 700,000 kilowatts and 220,000-volt transmission facilities. Provincial officials said today the plant will help ease the power shortage in greater Fuzhou, Fujian's capital city. The project is jointly funded by the Fujian Government and the Huaneng International Power Development Company, a joint venture between Fujian and a Hong Kong firm. [Text] [Beijing XINHUA in English 1404 GMT 1 Sep 86 OW] /6662

JIANBI UPDATE--Beijing, 2 Sep (XINHUA)--The Jianbi Power Plant in East China's Jiangsu Province has put another 300,000-kilowatt generating unit into operation, raising its total generating capacity to 1.325 million kilowatts. The unit, one of the major construction projects of the Seventh Five-Year Plan (1986-1990), can generate 5 million kilowatt-hours of electricity a day. [Text] [Beijing XINHUA in English 1415 GMT 2 Sep 86 OW] /6662

200MW XINGTAI GENERATOR--Beijing, 27 Sep (XINHUA)--A 200,000-kilowatt generating unit has been put into operation at the Xingtai Power Plant, Hebei Province, bringing the plant's total generating capacity to 490,000 kilowatts. [Text] [Beijing XINHUA in English 1614 GMT 27 Sep 86 OW] /9738

600,000-KILOWATT STEAM TURBINE--This year, the Harbin Steam Turbine Machinery Plant has produced a 600,000-kilowatt steam turbine for large-scale electric power plants. [This success] demonstrates that China's steam turbine manufacturing capability is approaching that of advanced world standards. [Summary] [Beijing RENMIN RIBAO (OVERSEAS EDITION) in Chinese 26 Sep 86 p 3] /7358

DAQING GAS TURBINE--The first set of thermoelectricity-and-gas turbine power generating unit in Daqing oil field's Laer thermal power station, the first natural gas power station completely imported from abroad, has been completed and has been fed into the power grid after smoothly passing its assessment of trial operation. The Laer thermal power station has two gas turbine power generating units. The facility uses natural gas to generate power. The entire station was imported from the United States. The total installed capacity is 85,000 kilowatts and the total investment was 155 million yuan. [Excerpt] [Harbin HEILONGJIANG RIBAO in Chinese 19 Oct 86 p 1] /9604

QINLING PLANT COMPLETED--Xi'an, 2 Nov (XINHUA)--The construction of northwest China's largest thermal power plant has been completed as the last generating unit went into operation 2 days ago. The Qinling thermal power plant in Shaanxi Province has six generating units with a combined capacity of 1,050,000 kilowatts and generates 6 billion kilowatt-hours a year, accounting for one-fifth of the total generated energy in northwest China. The plant has generated a total of 20.2 billion kilowatt-hours since 1972 when its first generating unit was commissioned. [Text] [Beijing XINHUA in English 0656 GMT 2 Nov 86] /9604

CSO: 4010/14

NATIONAL COAL CONFERENCE URGES MORE EXPORTS

OW281348 Beijing XINHUA in English 1217 GMT 28 Jun 86

[Text] Beijing, 28 Jun (XINHUA)--China exported 5 million tons of coal in the first half of this year, an increase of 54 percent over the same period last year, it was reported today.

A national conference on coal imports and exports, which ended here today, was told that China should meet its 10-million-ton export target this year.

The country has set an export target of 100 million tons of coal for the Seventh Five-Year Plan, which began this year, almost the total amount exported between 1949 and 1984.

During the Sixth Five-Year Plan, China exported 34.1 million tons--an average of 6.82 million tons a year.

Last year, the country dug out more than 854 million tons of coal, making it the second-largest producer in the world.

Vice-minister of coal industry Hu Fuguo told XINHUA that the growth of coal production over the past few years had eased the domestic shortage, thus paving the way for more export trade.

He said a number of mines containing quality coal would soon be designated as producers for export, and special funds would be allocated for expanding coal-dressing plants to dehydrate coal and reduce coal dust.

Hu added that his ministry would continue its close cooperation with Chinese railways, road transport and other departments ensure coal for export arriving on time.

/8918
CSO: 4010/63

ANHUI MINES TO PROVIDE MORE DRESSED COAL

OW220844 Beijing XINHUA in English 0725 GMT 22 Sep 86

[Excerpt] Hefei, 22 Sep (XINHUA)--Coal mines in Anhui Province, one of the most important coal production centers in China, will concentrate on producing higher quality coal in the next several years, provincial coal officials said today.

The mining administrators in the province have decided to build at least five new coal washing plants in the next 5 years, bringing the total to 12.

The best quality coal has been washed and sorted from stone, which does not burn.

But due to the lack of coal washing plants, most of the coal from Anhui is sold without being washed. This causes transportation problems and makes ignition difficult. Unwashed coal also means fewer profits. Washed coal sells for twice as much as unwashed coal.

By 1990, 80 percent of the 35 million tons of coal produced in Anhui will be washed before being shipped. These coal mines turned out 24 million tons of coal in 1985; only 30 percent was washed in their plants.

And by 1990, some of the washed coal will supply the Baoshan Steel Works in Shanghai, taking the place of imported coal.

China will also export the higher quality washed coal.

/8309
CSO: 4010/1

JILIN GOVERNOR COMMENTS ON GROWTH OF COAL INDUSTRY

SK020746 Shenyang DONGBEI JINGJI BAO in Chinese 6 Jun 86 Special Edition p 1

[Article by Gao Dezhan, governor of Jilin Province: "We Hope the Coal Industry of Northeast China Achieves Prosperous Development"]

[Excerpts] Since its founding 3 years ago, the Inter-Provincial Northeast China and Nei Monggol Coal Industrial Joint Corporation, under the leadership of the Ministry of Coal Industry, has earnestly implemented the principles issued by the CPC Central Committee and the State Council with regard to developing energy resources and scored large increases in coal output. The 1985 output of raw coal reached more than 100 million tons, a gratifying figure that merits our congratulations.

The northeast area is one of the important industrial bases in the country and has a long history of developing the coal industry. However, coal production in this area still falls short of meeting the needs of the growing economy because of the existing imbalance in the distribution of coal deposits, the levels of coal extracting technology, and between supply and demand. Since its founding, the coal industrial joint corporation has brought into play the advantage of conducting overall management of the coal industry by making unified plans and conducting unified development and management over the collieries in the three northeast provinces and the eastern areas of the Nei Monggol Autonomous Region. In implementing overall management, the joint corporation may carry out transprovincial operations in prospecting for mines; make transprovincial arrangements for renewing the outdated mining areas; conduct transprovincial readjustment among labor forces, financial sources, and material sources; and carry out transprovincial exchanges among the advanced technologies. All of these have played a positive role in promoting the development of coal sources in the zone, relieving the strained situation in energy resources in the northeast area, and making the economy prosperous in the minority nationality areas.

Since its founding, the coal industrial joint corporation has upgraded the standards of equipment and technology among the collieries in Jilin Province whose products are covered by the state unified plan, dealt with the problem encountered by the Liaoyuan Mining Administrative Bureau in renewing its outdated mining areas, and has accelerated the pace of building new coal

mining areas in Hunchun County. Meanwhile, with the assistance of the coal industrial joint corporation, our province has achieved more rapid growth in local coal industries. In 1985 Jilin turned out 8.63 million tons of raw coal, a 1.455-million ton, or 20 percent, increase over the 1983 figure. The proportion of coal outptu scored by the local collieries in the province's total coal output increased from 29.1 percent in 1980 to 37.3 percent in 1985. These local collieries have become an important component part of energy resource production in the province. They have played an important role in ensuring the steady, stable, and harmonious development of the national economy in the province. For this, we extend hearty appreciation to the broad masses of cadres, staff members, and workers on the coal industrial front.

Paying attention to developing energy resources and maintaining a stable increase in coal output are one of the province's important measures for developing the economy during the implementation period of the Seventh 5-Year Plan. During the period, our province has assigned local collieries the goal of producing 10 million tons of raw coal by the end of 1990 and to make an effort to produce 12 million tons. However, though the local collieries in the province have many favorable conditions for fulfilling the target mentioned above, and they still have many difficulties in this regard because of their poor foundations, backward technology, and shortage of funds and experts. We ardently hope that the coal industrial joint corporation will vigorously support the local collieries in the supply of material sources, technology, and experts in order to enable them to make progress as soon as possible.

/6662
CSO: 4013/8

LIAONING GOVERNOR OUTLINES ACHIEVEMENTS, GOALS OF COAL INDUSTRY

SK020541 Shenyang DONGBEI JINGJI BAO in Chinese 6 Jun 86 Special Edition p 1

[Article by Quan Shuren, governor of Liaoning Province: "Develop the Coal Industry To Ensure the Completion of the Four Modernizations"]

[Excerpt] As an important economic zone in our nation, the three provinces in Northeast China and the Nei Monggol Autonomous Region undertake an important task for realizing the fighting goal of quadrupling the total industrial and agricultural output value by the end of this century. However, shortage of energy resources is a factor seriously affecting the economic development of Northeast China. In order to eliminate the contradiction, the Northeast China and Nei Monggol Coal Industrial Joint Corporation was established in 1983 with the approval of the State Council to make unified planning, development, and management of the coal industry of the three provinces of Northeast China and the areas in the eastern part of Nei Monggol Autonomous Region. Since its founding 3 years ago, the company has strengthened the prospecting and development of natural resources, has accelerated the transformation of mining areas, and has enhanced management over the enterprises under the guidance of the principles of relaxing policy restrictions, enlivening the economy, and rapidly developing existing natural resources. The output of raw coal increased by a large margin thanks to the company's measures for reform. It has made great contributions to accelerating the fulfillment of the Sixth 5-Year Plan and to facilitating economic prosperity and development.

Like the economic zone, our province has made great development in the coal industry over the past few years. The province had prefulfilled the coal production target set forth in the Sixth 5-Year Plan by 1 year. The coal output in 1985 reached 45.41 million tons, an increase of 21.7 percent over 1980. The company has given great assistance and support to our province in terms of conducting geological prospecting of coal mines and cultivating key specialized and technological personnel. A good situation has emerged among local collieries. The output of raw coal in 1985 reached 9.17 million tons, showing an increase of 4.26 million tons over that of 1980 and registering an annual average increase of 852,000 tons. Thus, local collieries have played a key role in our province's energy production. Improvements have been made in coal supply and the coal shortage has been alleviated thanks to

the assistance of the state and the company provided over the past few years. The province fulfilled most of the production targets set forth in the Sixth 5-Year Plan 1 or 2 years ahead of schedule. Despite serious natural disasters, the total industrial and agricultural output value in 1985 reached 80 billion yuan, an increase of 13.4 percent over that of 1984. The great changes that have taken place in Liaoning's economy are closely related to the growth of the coal industry. As an old key industrial base, Liaoning has a large number of key enterprises requiring a lot of energy. Thus, the coal supplied by the province's collieries falls far short of demand. The economic zone must make a unified plan to allocate and distribute coal to the province. The growth of the coal industry of the economic zone has played a key role in ensuring a sustained, steady, and coordinated development of our province's economy.

As an open coastal area, Liaoning has rich natural resources and a solid foundation for developing industry. In accordance with the target for registering an 8-percent increase in the annual average industrial and agricultural output value set forth in the Seventh 5-Year Plan, the province's annual industrial and agricultural output value in 1990 should show an increase of 123 percent over that of 1980. Through technological transformation, key trades and enterprises should greatly change their appearances, notably upgrade the technological level of their products, and greatly increase their economic results. In order to realize these targets, we should balance the relations between different sectors of the economy and eliminate the weak links in economic development, including the shortage of energy resources. Although the coal shortage has been alleviated, we have not thoroughly solved this problem. Viewing the province's situation, during the Seventh 5-Year Plan period the province's coal supply fell far short of demand. So, the economic zone is required to properly increase its coal production to ensure the supply for Liaoning Province. While increasing the output, the economic zone should further solve the problems related to the coal quality so as to make its coal suitable to the needs of the economic development. While developing unified distribution collieries, we should further develop local collieries. Our province has no solid foundation for developing local collieries and has many difficulties in developing geological resources and technological forces and collecting funds for mine construction. Therefore, the Northeast China and Nei Monggol Coal Industrial Joint Corporation and the unified distribution collieries should continue to vigorously support the growth of the province's local collieries.

/6662
CSO: 4013/8

HEILONGJIANG GOVERNOR ON DEVELOPING COAL TO SERVE ECONOMY

SK020840 Shenyang DONGBEI JINGJI BAO in Chinese 6 Jun 86 Special Edition p 1

[Article by Hou Jie, governor of Heilongjiang Province: "Develop Cooperation in Order To Provide More Coal To Vitalize Northeast China's Economy"]

[Text] It has been 3 years since the establishment of the Northeast China and Nei Monggol Coal Industrial Corporation, the largest joint corporation on our country's coal industrial front. Over the past 3 years the corporation has enthusiastically developed cooperation between the trades of the three provinces and one region, and has made contributions to promoting a sustained, steady, and soundly rapid development of coal production. Take for example the four mining administrative bureaus in Heilongjiang Province, whose products are distributed under the state unified plan, namely the Jixi, Hegang, Shuangyashan, and Qitaihe Mining Administrative Bureaus. The annual average increase of raw coal output in these 3 years was 2.438 million tons, setting a record in history. Simultaneously, under the guidance of the province's principle of conducting system reform, technological transformation, and opening to places inside and outside the country so as to make the country and the people prosperous, under the specific guidance of the Northeast China and Nei Monggol Coal Industrial Joint Corporation, and with the great assistance of all collieries whose products are distributed under the unified plan, the local collieries throughout the province have opened up a new situation in which they have registered the fastest growth rate and have made the greatest development since the founding of the PRC. The raw coal output of the local collieries in 1985 reached 19.62 million tons, doubling the figure in 3 years and registering an annual average increase of 3.23 million tons. Thanks to the concerted efforts made by the collieries whose products are distributed under the state unified plan, a situation that has not been seen for many years has emerged in which the contradictions between the supply and demand of coal have been alleviated. Leading cadres of collieries and the vast number of staff members and workers have made due contributions to alleviating the shortage of energy resources and to accelerating the four modernizations.

As has been proven in practice, the policy decision to establish this corporation was a correct measure as well as a useful attempt to open up new avenues for coal industrial development, since the corporation was established in line with the demands of the Northeast China Economic Zone's economic development to carry out unified planning and the system of sharing management between different levels, to rationally develop natural resources, and to arouse the enthusiasm of all fields.

Located in the northern part of the Northeast China Economic Zone, over a long period of time Heilongjiang Province has closely maintained economic relations with Liaoning and Jilin Provinces and Nei Monggol's eastern areas. Helongjiang Province has rich coal resources and convenient transportation. Through construction carried out over the past 30 years or so since the founding of the PRC, the province has considerably large scope and foundation for coal production and enjoys exceptional advantages in making smaller investments to quickly developing coal resources. According to the strategic development plan of the Northeast China Economic Zone, Heilongjiang Province should concentrate its coal development on serving Liaoning and Jilin Province and strive to produce more good coal, and to make the most of its rich natural resources so as to serve the construction of the entire economic zone. So, our province has tended to vigorously develop its coal production. The founding of the corporation has created profitable and objective conditions for rationally developing coal resources and balancing technological forces. Thus, we cannot separate the rapid development of the province's local collieries made over the past 3 years from the assistance and help provided by the corporation and the collieries whose products are distributed under the state unified plan.

The Seventh Five-Year Plan period is a key period of the nation's economic construction as well as a key period to lay foundation for realizing an economic leap in the 1990's. As an important economic zone and an old industrial base of China, Northeast China has taken on an important task of realizing the quadrupling goal. The shortage of energy resources is the key weak link affecting the economic development of Northeast China. So we must continue to persistently make progress in the course of reform and make greater efforts to develop the coal resources of Northeast China in line with the principle of undertaking unified planning, sharing management between different levels, and conducting rational development. Simultaneously, we should make efforts to quickly and comprehensively develop coal production and provide more and better coal resources for accelerating Northeast China's industrial and agricultural production, particularly the development of such basic heavy industries as metallurgical power and machine manufacturing industries, in an effort to make Northeast China, an old industrial base, take on a youthful look and take a vigorous leap.

/9716
CSO: 4013/11

NEI MONGGOL CHAIRMAN REVIEWS COAL DEVELOPMENT

SK010746 Shenyang DONGBEI JINGJI BAO in Chinese 6 Jun 86 Special Edition p 1

[Article by Bu He, chairman of the Nei Monggol Autonomous Regional People's Government: "Accelerate the Development of Coal Resources To Make the Economy of Northeast China and Nei Monggol Flourish"]

[Text] It has been 3 years since the inter-provincial Northeast China and Nei Monggol Coal Industrial Joint Corporation was established with the approval of the State Council. As has been proved in practice during the past 3 years, the decision to establish this corporation was correct and necessary. It has had greatly accelerated the development and utilization of the coal resources in the three provinces of Northeast China and eastern Nei Monggol, in alleviating the strained energy supply in Northeast China, and in making the economy of Northeast China and Nei Monggol flourish.

Coal is the major energy resource of our country. The three leagues and one city in eastern Nei Monggol have abundant coal resources, and their coal reserves amount to one-fifth of Nei Monggol's total. With the concern, support, and assistance of the party Central Committee and the State Council, Nei Monggol built the Pingzhuang, Zhalainuoer, Dayan, Huolinhe, and Yiminhe coal mines one after another. The establishment of these five major coal mines played a definite role in the development of Nei Monggol's economic construction. However, due to the restrictions of administrative divisions, few lateral ties, and a shortage of funds, the coal resources in eastern Nei Monggol have yet to be fully developed and utilized, and are far from being compatible with the needs of today's economic and social development. The Northeast China and Nei Monggol Coal Industrial Joint Corporation has scored great achievements in its work over the past 3 years. For example, Eastern Nei Monggol's five coal mines, whose products come under unified state distribution. Their raw coal output in 1985 was 56.7 percent higher than in 1982, before the corporation was established, and their investment in capital construction was 97 percent greater. In 1985, they suffered deficits totaling 42.71 million yuan. Compared with 1982, the deficits of the Pingzhuang, Dayan and Zhalainuoer coal mines declined by 27.7 percent. In the past 3 years, they turned over 34.762 million yuan in taxes to the state and invested 176 million yuan in supporting 41 projects in pastoral areas. The corporation has provided 19.968 million tons of coal to eastern

Nei Monggol in the past 3 years, an increase of 487,000 tons compared with the period before it was established. These achievements show that the establishment of the corporation, which eliminated the barriers between different areas to carry out lateral cooperation, worked out plans for, developed and managed the coal industry of the three Northeast China provinces and Eastern Nei Monggol in a unified manner, and conducted unified planning for and control over capital construction, geological prospecting, and scientific research and designing of these areas, not only enabled the coal industrial production and construction of eastern Nei Monggol to make notable progress but also made prominent contributions to alleviating the strained energy supply in Northeast China.

The party Central Committee formulated a grand plan and fighting goals for our country during the Seventh 5-Year Plan period. I hope that in line with the actual conditions of Eastern Nei Monggol, the corporation will carry forward its achievements and make still further progress. I also hope that in its future work, the corporation will deal with more successfully the issues concerning the relations of resources development to urban construction, and modernization of pastoral areas, and those of economic development to making the culture and education of various nationalities flourish, and the issues concerning the comprehensive development of coal, electricity, and chemical industrial products, and will make still greater contributions to accelerating the development and utilization of the coal resources of the three Northeast China province and Eastern Nei Monggol, and to making the economy of these areas flourish and prosper.

/6662
CSO: 4013/8

COAL

BIG NEW FIELD TO BE MINED BY LOCAL COMPANIES

OW131747 Beijing XINHUA in English 1539 GMT 13 Oct 86

[Text] Hohhot, 13 Oct (XINHUA)--China will for the first time designate one of the largest new coal fields to be mined by localities in order to help the resource-rich but economically poor area to prosper.

This was disclosed today by Xiao Han, deputy director of the State Council's energy office, after an inspection tour of the coal field.

The Shenfu-Dongsheng coal field is one of the seven largest in the world, with a verified reserve totalling 17 billion tons. It is situated in the Ordos Basin that embraces southwest Inner Mongolia and northern Shaanxi Province.

The mines will be constructed and extracted by Inner Mongolia and Shaanxi with state loans while the state undertakes to build the railroads to transport and market the coal produced.

This is a new arrangement by the Ministry of Coal Industry. Large coal fields in China are generally state owned and administered by the coal ministry. And only small coal pits are left to localities and individual peasants.

Currently, Inner Mongolia and Shaanxi each has a company working under the administration of the Huaneng Dressed Coal Company, which is directly led by the State Planning Commission.

Under the new arrangements, the two local companies will practice independent accounting, responsible for their own profits and losses, and operate under the state dressed coal company by contract.

The dressed coal company will raise funds and provide loans to the mining companies and is in charge of the purchase, shipment and sale of coal. Anyone who borrows funds will pay them back and the mines then belong to the builders.

This contract system will be good for peasants, the localities and the state, Xiao noted.

"A positive local impact can not be overestimated with such an administration," Xiao said.

The opening of the mines will stimulate the development of local transportation, power industry, the processing of animal by-products and other local industries. A number of coal-fueled power plants may be built there so that the poor area will become one of the largest power industrial bases in China. In addition, the mines will provide large numbers of employment opportunities for local people, he noted.

An expert group will be sent to the coal field this month to make a further inspection before the final decision is made, Xiao said.

/12624
CSO: 4010/7

BRIEFS

SEMIANNUAL TARGETS MET--Beijing, 28 Jun (XINHUA)--China's 95 coal mines managed by the Ministry of Coal Industry had produced 203.47 million tons as of 24 June, slightly topping the semi-annual goal, a ministry official said here today. The coal output was up 4 million tons over the same period in 1985, according to the official. The goal for a full 6 months this year was 203.38 million tons. Altogether, China produced 847 million tons of coal last year, about half from the major mines under the ministry's direct supervision. The other half was produced by local coal mines, owned by provinces, prefectures, counties, collectives, or individuals. [Text] [Beijing XINHUA in English 0553 GMT 28 Jun 86 OW] /8918

SHANXI OUTPUT UP--From January to August, coal mines in the province whose products are distributed by the state in a unified way produced 55.37 million tons of raw coal, an increase of 3.11 million tons over the same period of last year. [Summary] [Taiyuan Shanxi Provincial Service in Mandarin 2300 GMT 6 Oct 86 HK] /6662

ANOTHER JIANGXI FIND--Nangchang, 20 Oct (XINHUA)--Mining experts in Jiangxi Province have discovered a large coal field with a reserve of more than 130 million tons, officials of the Provincial Prospecting Company said today. They said the coal field, in Qujiang Prefecture of the southeastern China Province, covers an area of 50 square kilometers. "Fortunately, the field happens to be located near existing railroads," one official said. "We'll be able to mine and ship this coal pretty easily." Overall, the officials said, Jiangxi has verified coal reserves of 1.5 billion tons, making it a major source of coal for the nine provinces south of the [Chang Jiang]. [Text] [Beijing XINHUA in English 0632 GMT 20 Oct 86 OW]

SLURRY PLANT BEGINS OPERATION--Shenyang, 2 Nov (XINHUA)--China's first pilot plant to produce coal slurry to replace oil has gone into operation in Fushun coal administration, Liaoning Province. Coal slurry, a mix of coal powder, water, and additives, is 20 and 40 percent better than coal in heating and burning efficiency respectively. With an annual capacity of 50,000 tons, the plant is designed to verify the feasibility of coal slurry in oil-burning boilers and provide such fuel for industrial enterprises. [Text] [Beijing XINHUA in English 0732 GMT 2 Nov 86] /9604

MARINE COAL SHIPMENTS--Beijing, 29 Sep (XINHUA)--Landlocked Shanxi Province, China's main source of coal, has begun using ships to send its output to China's energy-short southeast coast. It sent its first shipment of 20,000 tons east by rail to Qinhuangdao Harbor in Hebei Province and then south by sea to Fujian Province. [Text] [Beijing XINHUA in English 0713 GMT 29 Sep 86 OW] /9738

CSO: 4010/8

ZHONGYUAN TO BECOME LARGE-SCALE OIL, GAS BASE

HK040851 Hong Kong ZHONGGUO XINWEN SHE 0730 GMT 1 Nov 86

[Report by Jin Guolin [6855 2654 2651]: "Zhongyuan Oil Field To Be Built Into Comprehensive Base for Producing Oil, Gas"]

[Text] Zhengzhou, 1 Nov (ZHONGGUO XINWEN SHE)--China's petroleum departments are carrying out large-scale prospecting and exploitation of oil and natural gas on more than 5,300 square kilometers of land on the banks of the Huang He in the central plains to build the Zhongyuan oil field into a large-scale comprehensive base for producing oil and natural gas.

This growing oil and gas base is expected to produce 10 million tons of crude oil and 2 billion cubic meters of natural gas annually, by 1990.

The Zhongyuan oil field is located on the border of the eastern part of Henan Province and the western part of Shandong Province. The oil field has rich oil and gas reserves and the volume of natural gas reserves is second only to Sichuan's natural gas fields in China. This is a favorable condition for the oil field to be developed into a new-type oil and gas base.

At present, the state has adhered to the principle of "simultaneously developing oil and gas production" in the development of construction work here. More than a dozen oil and gas fields have been discovered and more than 1,300 oil and gas wells have been sunk. The Zhongyuan oil field now has an annual capacity of 6.3 million tons of crude oil. A gas processing plant has also been built with a daily processing capacity of 550,000 cubic meters of natural gas. This plant is now supplying Zhengzhou and Kaifeng with gas daily. In the coming 4 years, three large gas processing plants with a total daily processing capacity of 2.4 million cubic meters of natural gas will also be built here. They will provide gas for Henan and Hebei Provinces.

/9604
CSO: 4010/12

DUSHANZI BECOMES MAJOR REFINING BASE OF NORTHEAST

HK011016 Urumqi Xinjiang Regional Service in Mandarin 1300 GMT 30 Sep 86

[Excerpts] After 37 years of development, Dushanzi oil refinery, one of China's three major producers of oil, has become an important oil refining base in northwest China, as well as a major pillar of the region's economy.

Installed with 14 sets of major production installations and 4,890 sets of equipment, it has an annual capacity of refining 1.5 million tons of crude oil, an increase of 22 times over levels recorded soon after the founding of the state. It produces 160 kinds, or 19 lines, of goods under six categories, including fuel oil, lubrication oil, petroleum coke, and asphalt. The number of products made by the refinery has been increased by 23 times compared to that soon after the founding of the state.

During the period between the state's founding and 1985, the refinery had accumulatively delivered 2.7 billion yuan worth products to the state, which is equivalent to the total sum of building 12 oil refineries at the present scale.

The Dushanzi refinery was built in October 1936. After liberation, the declining Dushanzi oil field gained new vitality. By the end of 1960, the refinery had eight sets of major installations and had an annual capacity of refining 800,000 tons of oil. It produced 80 kinds of goods under six categories. After the cracking of the gang of four, in particular following the 3d Plenary Session of the 11th CPC Central Committee, the refinery worked hard to improve its intensive refining procedures, readjusted the product structure, and improved the competitiveness of its goods. It therefore remarkably improved the economic results.

In 1982, it successfully developed the dual-purpose hydraulic transmission oil for tractors, the quality of which reached the U.S. standards and even surpassed the quality of the U.S. product in some areas. In 1984, it started producing oil for train axles, which has a property of tolerating the great temperature difference between north and south China. The product thus saves manpower and material resources, speeds up the turnover rate, and saves 1.4 million yuan per year for the railway departments.

In 1985, its annual sales revenue totalled 441.9 million yuan. As it attached great importance to improving the comprehensive economic results of the enterprise, it achieved since 1978 a simultaneous growth in refining volume, gross output value as well as tax and profit delivery.

Last year, it refined 1.302 million tons of crude oil and its gross output value totalled 502 million yuan. The tax and profit delivery totalled 244 million yuan.

In the wake of production development, the refinery often sends thousands of technological core personnel and experts to help develop the Karamay and Urumqi petrochemical plants, (Zekou) petroleum-chemical plant in southern Xinjiang, as well as oil and gas fields in north, central, and east China.

The refinery has also perfected such institutes as a research center, a designing institute, and schools. Cultural and welfare facilities such as hospital, shops, library, and clubs have also been set up. Water and power supply systems are also perfected.

/6662
CSO: 4013/8

TECHNOLOGY IMPORTS HELP MAOMING PETROLEUM FIRM

OW160450 Beijing XINHUA in English 0259 GMY 16 Oct 86

[Text] Guangzhou, 16 Oct (XINHUA)--The Maoming Petroleum Industrial Company in Guangdong Province has developed petroleum-based export products thanks to use of imported equipment.

The company, the biggest of its kind in this south China province, can now produce 800,000 tons of petroleum-based products for export against 500,000 tons in the past, a company official told XINHUA today.

He said the variety of export products has increased from seven to 21.

"Last year, total export volume reached 170 million U.S. dollars," the official said, "and today, Maoming has become a key producer in south China."

Since it imported hydrocracking equipment from Japan in 1982, the company has produced 1.4 million tons of quality products by the end of last month, with some receiving state recognition for high quality.

The company official said the equipment has generated about 290 million yuan (78.4 million U.S. dollars) in tax and profits turned in to the state in the past 3 years, 2.5 times more than the initial investment for the equipment.

The company, set up in 1955, has also imported paraffin wax molding equipment, thus increasing output and raising quality. Today, it can export more than 10,000 tons of paraffin wax products a year to more than 20 countries and regions, the official said.

The company's lubricant products are now exported to the United States after an automatic filter press was imported from Japan, a key machine for lubricant production.

/12624
CSO: 4010/7

WORLD BANK LOANS USED FOR OIL FIELD EQUIPMENT

OW010038 Beijing XINHUA in English 1529 GMT 31 Oct 86

[Text] Beijing, 31 Oct (XINHUA)--China has used World Bank loans totalling over U.S.$260 million to purchase equipment through international bidding for the Daqing oil field, the largest one in China, and other oil fields in the past 3 years, an official from the international tendering company said here today.

He said at a bid-opening ceremony, most of the equipment used for oil exploration and development are operating well and have yielded good economic results.

The World Bank is satisfied with the use and results of its loans after examining the projects, he added.

It is learned that the bank is to provide more loans for China's oil field projects.

The bids which opened today are mainly for purchase of separators, heating machines, dewatering devices, measuring instruments and computers for a separating station in the Daqing oil field in northeast China.

Firms from Canada, the Federal Republic of Germany, France, Italy, Japan, the United States and Yugoslavia made tenders for the project, for which the World Bank provided a loan of U.S.$7 million.

This is the first time for Daqing to purchase a complete set of equipment for a station of this kind, according to an official from Daqing.

Other separating stations are equipped mainly with Chinese-made instruments, computers, and other equipment, he added.

/9604
CSO: 4010/12

FIRST CHINESE-BUILT OFFSHORE PRODUCTION PLATFORM COMPLETED

OW200840 Beijing XINHUA in English 0748 GMT 20 Sep 86

[Text] Beijing, 20 September (XINHUA)--Work was completed today on the first Chinese-built offshore oil production platform, 200 kilometers southeast of Beijing in the Chengbei oil field of Bohai Bay.

The platform will be operated by the Chengbei Oil Development Corporation of Japan, which will begin production in November, officials said.

With construction supervised by the China Offshore Platform Engineering Corporation, the platform was in part designed as a showcase for Chinese marine engineering and construction.

Hu Yichen, deputy director of the corporation said today China has extensive experience building offshore drilling rigs. But, he said "the building of this production platform will allow us to enter the international marine construction market."

Engineered to meet contemporary international technical standards, the steel platform can produce as much as 4,000 barrels of crude oil and 40,000 cubic meters of natural gas a day.

The production platform was built by the Dalian Shipyard. It includes oil and gas refining equipment and is connected to a utility and accommodation center, built by the Xingang Shipyard. Both the platform and the center were designed by the Shanghai Offshore Engineering Corporation.

The complex stands on steel jackets fixed in the seabed 15.3 meters below. The production platform sits astride 23 oil wells, sunk 1,680 meters into the bay's floor.

The utility and accommodation center includes three electric generators, a desalination plant, and 20 rooms with 74 beds.

The platform has been built in accordance with the standards of the American Petroleum Institute, the American Welding Society and the American Bureau of Shipping in the United States.

/12232
CSO: 4010/3

FIRST-PHASE BEIJING GAS DIVERSION PROJECT COMPLETED

SK020855 Beijing BEIJING RIBAO in Chinese 19 Sep 86 p 1

[Excerpts] A 20,000-cubic meter spherical storage facility, a key link of the project to divert natural gas from the Huabei oil field to Beijing Municipality, was completed in the Beijing coking plant and has gone into operation. By the end of this year, 40,000 families throughout Beijing Municipality will be able to use natural gas. To date, the first-phase project to divert natural gas from the Huabei oil field to Beijing has been completed.

This station is the first of its kind in our country. The geometric volume of the four spherical tanks totals 20,000 cubic meters. These four tanks can store up 100,000 cubic meters of natural gas.

The first-phase project includes 9 gas collection stations, more than 100 km of gas collection pipelines, 3 treatment stations, more than 130 km of gas pipelines, a "gate station" in Beijing, and a spherical storage facility. The Ministry of Petroleum Industry and the Huabei oil field have given great support to the construction of the project. Departments under the Ministry of Petroleum Industry have invested more than 90 million yuan in this proejct. So far, the Huabei oil field supplies 50,000 cubic meters of natural gas to the municipality every day (equal to 100,000 cubic meters of coking coal gas).

/7358
CSO: 4013/5

UNITS GEAR UP FOR FULL-SCALE EXPLORATION OF TARIM BASIN

HK250123 Urumqi Xinjiang Regional Service in Mandarin 1300 GMT 23 Sep 86

[Text] Full preparations are being made for the exploitation and use of natural resources in the Tarim Basin. Scientific research on the formation and development of the Tarim Basin and the location of large oil and gas fields, a priority scientific and technological project of China's Seventh 5-Year Plan, has officially started.

This project is being undertaken by the Chinese Academy of Sciences. In August, the academy gathered some 160 senior and middle-level scientific research personnel from six research institutions including the Lanzhou Geology Institute, the Beijing Geophysics Institute, and the Nanjing Geology and Soil Biology Institute and dispatched them to conduct comprehensive research on the Tarim Basin in the fields of geophysics, paleobiogeology, and organic geochemistry. Through the research on the formation and development of the Tarim Basin and the location of large oil/gas fields, they will determine the geological development of the basin and the laws of oil and gas formation, forecast favorable areas and locations for tapping large oil/gas fields in the basin, study the oil-bearing potential of the basin and provide a scientific basis for determining the location of large oil and gas fields. They will also establish the basic theory on petroleum geology with Chinese characteristics.

To ensure the quality of the high-level scientific research, the Lanzhou Geology Institute and other research units have imported some advanced analysis instruments of the 1980s from foreign countries, such as thermal analysis instruments, spectroscopic and mass spectrographic analysis combined instruments, and isotrons.

/8309
CSO: 4013/3

OIL SEISMIC ACHIEVEMENTS IN 6TH FYP, TARGETS FOR 7TH FYP DISCUSSED

Baoding SHIYOU DIQIUWULI KANTAN [OIL GEOPHYSICAL PROSPECTING] in Chinese Vol 21, No 4, 15 Aug 86 pp 339-342

[Article by Lu Yousheng [0712 0645 3932]]

[Text] During the Sixth Five-Year Plan (1981 to 1985), there were great 9evelopments in the seismic prospecting work of China's oil industry. Under extremely complex conditions, both on the surface and underground, each production target was attained or surpassed. New methods and new technologies received rather extensive popularization and application. There were notable rises in the prospecting levels, efficiency, and in economic benefits, and the scope of prospecting continuously expanded. The increase in geological reserves and the rise in crude oil output provided a vast reserve front for the 6th FYP and made new contributions for the oil industry to enter into a new development phase. It also laid a foundation to make the Seventh Five-Year Plan a key period in the history of seismic prospecting for China's oil industry.

Major Achievements of the 6th FYP

1. Prospecting efficiency continued to increase. Each production target constantly broke all-time highs. Seismic profiles completed on land during the 6th FYP correspond to 37 percent of the accumulated total amount of work on land for the whole country from 1952 to 1985, an increase of 45 percent over the 5th FYP. Comparing 1985 to 1980, the annual amount of work increased 188 percent, the average team-year seismic profiles completed increased 205 percent, and the average number of team-year blasts increased 274 percent. These set all-time highs in the seismic prospecting of China's oil industry. The increase in prospecting efficiency was rather large, especially for the Xinjiang, Qinghai, Yumen and other units in the western region where the average team-year seismic profiles completed reached more than 600 km. In 1985, well-shooting team 299 of the Daqing Oil Field Physical Exploration Company completed 1,294.5 km of 12-trace overburden seismic profiles setting a record for well-shooting teams. Controlled Earthquake Focus Team 2206, Second Company, Physical Exploration Bureau, completed 1,518 km of 24-trace overburden profiles, setting a record for such teams.

Paper received 14 April 1986

2. Basically, field collected digitizing has been achieved; overburden traces have increased and data quality has risen. China's importing of digital seismic technology began in the mid-seventies, but basic achievement of digitizing did not come until the 6th FYP. The average number of tracks for the seismic team increased more than two-fold, and the overburden traces also rose across the board. Statistically, six-trace and under overburden profiles comprised 60 percent of the total amount of work in 1980 and 24-trace and above overburden profiles only comprised 3 percent of the total amount of work. In 1985, six-trace overburden profiles comprised 4 percent of the total amount of work, 12-trace overburden profiles comprised 25 percent of the total amount of work, 24-trace overburden profiles comprised 60 percent of the total amount of work, and 48-trace and above overburden profiles comprised 11 percent of the total amount of work. At the same time, in order to raise the data quality, crooked survey and breadth-line profiles and 3-D seismic prospecting methods were used, causing the rate of data quality to reach 99.6 percent and the rate of high-grade product to reach 58.9 percent.

3. There was a great qualitative and quantitative increase in data processing. In respect to the digital processing technology, digesting the software and applications programs of each computer system was the main work and many revisions were carried out; the efficiencies of the computers were raised. Presently, the data processing capabilities is equal to about 10 times that of the end of the 5th FYP. The routine amount of processing in 1985 was twice that of 1980 and average computer availability was 90 percent. In respect to the processing methods, they were still directed at the special characteristics of China's geophysical data and at the requirements for its technical development, developing more than 130 new seismic, electrical, and gravity models. At the same time, in order to meet the needs of prospecting's complex, hidden oil deposits, there was great development in the special processing of seismic data. The amount of special processing in 1985 was equal to 34 times that of 1980, as from the original, several processing methods have developed some 10-odd items. Due to the growing requirements in regard to processing precision and processing levels, processing flow has become more and more complex, and intermediate monitoring has become more and more detailed. The processing technologies have basically reached or approached advanced world levels. At present, data processing work is developing in the direction of high resolution ratios, high fidelity, and high signal-to-noise ratios.

4. The work of perfecting complete sets of seismic team equipment was reinforced and the mechanized operational abilities were increased. In the 6th FYP, due to the work which strengthened domestic manufacturing and importing, a great amount of seismic drills, water kegs, cross-country vehicles, and other auxiliary equipment were added. Not only were the mobility and adaptability of the seismic team increased, but several areas which were formerly "forbidden zones" due to the seismic teams' equipment being poor and seismic prospecting not being able to be carried out were also penetrated. Good data was obtained in areas where the surface and underground conditions were most complex. Statistically, field team vehicles with drills and vehicles of each type in 1985 increased 35 percent and 123 percent respectively over those in 1980. At the same time, in order to adapt to the

complex and varied surface conditions and geological requirements, flatlands teams, desert teams, limnological teams, beach teams, 3-D teams, transverse wave teams, and VSP teams were established and furnished with the appropriate equipment, personnel, and technical cadres. Thus, the workers' labor intensity was lightened, prospecting efficiency was raised, and the quality of the field work carried out was assured, enabling flexibility in mobility of the movement of the ranks and high safety in the carrying out of the organization's work.

5. A group of technical forces adhering to first-line production for the long term was fostered. By the end of 1985, technical cadres of each type comprised 12.9 percent of the total number of staff and workers within the system of physical exploration for oil throughout the country. Of these, technical personnel who were directly engaged in the technical work of production in physical exploration comprised 63.8 percent of the total number of technical cadres. These technical cadres were proficient in each item of professional work and were familiar with China's geological situation; they played a tremendous role in business management, field collection, and data processing and in interpretation of the results and were an indispensable force on the physical exploration front.

6. New methods and new technologies received rather broad popularization and application. In the 6th FYP, new technologies popularized and applied were mainly 3-D seismic prospecting, seismic stratigraphy, vertical seismic profile methods, transverse seismic waves and man-machine interface interpretive systems. Especially so was research work in seismic stratigraphy. This work began in 1979, and along with the continual deepening of prospecting work, there has been a continual raising of data processing and interpretation levels and there were more and more newly discovered stratigraphic and lithologic traps. In research methods, there has been a gradual transition from the use of ordinary simple seismic information to the study of conditions of stratigraphic and lithologic changes of a region to conduct thorough studies by parts of seismic stratigraphy on a wave set or on a single wave. The usable information has increased from an original four kinds to fourteen kinds. In the area of 3-D seismic prospecting, rather good results have also been obtained. In the 6th FYP, altogether 26 3-D projects were completed, carried out in a 2,000 km^2 area. In using the results of the 3-D prospecting to arrange the wells, the well-drilling success rate was clearly raised.

7. There were new developments in result interpretation and overall research work. It was shown mainly in the following three areas: First was in development from simply using seismic data to carry out interpretations of geological structures in the past to using seismic, survey well, drill well, geologic and other data to carry out a comprehensive interpretation study of structure, strata, rock types, oil and gas evaluations and other aspects; second was in changing from only tracing several obvious key beds and simply carrying out interpretations of structural shapes to having maps made for noting interstrata structures, small range structures and special lithologic bodies; third was in having model deductive and inductive experiment studies carried out in several key oil-bearing areas and special processing of man-machine interfaces and seismic data, enabling interpretation precision to be even more accurate and reliable.

8. Prospecting results were rich and varied and economic benefits rose remarkably. In the 6th FYP, along with the development of digital technology, rather large changes took place in seismic prospecting from field collection and data processing to result interpretation and other aspects. There were obvious rises in the ability to handle outstandingly complex fault blocks and complex structures, enabling good results to be obtained in areas where much of the data was not good or where data was unobtainable. Statistically, from 1980 to 1985, the number of newly discovered traps and the areas of the traps has continued to grow at a rate of 30 percent each year.

(a) New results have been obtained in old oil areas. For example, ever since launching digital seismic prospecting in the western Liaohe Oil Field in 1980, there have been obvious advances in data quality: First was that the shape of the basement was determined, and row upon row of hidden mounts and Tertiary structures were discovered; second was that a set of source beds of four segments of sand that had never been discovered under three segments of sand was discovered and that the central hidden mount belt was situated right in the middle of this source rock, being typical of any hill-type, hidden mount oil deposits; third was that a great amount of river course sand and alluvial fans were discovered in the segments and the area for looking for oil was continually enlarged. Also, in the eastern declivity belt of the depressions within Hebei, seismic prospecting confirmed that this declivity belt was a belt of three rows of large hidden ranges made up of 24 mountaintops; drilling has confirmed that a well with a 6mm mouth could produce 65 tons of oil and 64,460 m3 of natural gas a day. This was yet another great discovery following that of hilly oil fields.

(b) Great achievements in new area prospecting were countless. In the last 5 years, there were about 800,000 sq km of newly opened up areas, mainly including large desert, mountain, Gobi, beach, and marshland areas. For example, structural indications were discovered in the beach area of Shandong in 1983 and that this area was a rather large covered-up Tertiary structure was ascertained in 1984. Drilling confirmed that there were five sets of oil-bearing strata, and of the several tens of wells that were drilled, not one came out empty. It is one of the largest oil fields discovered in the last several years in China. Aside from this, general survey prospecting work for many basins has been opened up in the eastern areas. Of these, 60,000 km of seismic profiles have been completed for two contiguous basins. A series of source segments were confirmed and an oil deposit was discovered. In the western areas, a large program of general regional surveys were developed for the large Junggar, Tarim, and Qaidam basins. The geological structure, fault layout, and stratigraphic distribution for the basin regions has been basically ascertained. A group of local structures has been discovered, areas favorable to bearing oil have been determined, and a foundation has been provided for correctly evaluating these three large basins.

Major Targets in the 7th FYP

The Seventh Five-Year Plan will be a key period in the development of China's oil industry and the major tasks in the work of the physical exploration for oil will be: raising prospecting efficiency, reaching 150 million tons of

annual crude oil production and 15 billion m^3 of annual natural gas production by 1990, and prepare sufficient reserve fronts; creating conditions for a large development of the oil industry in the years 1991 to 2000; and gradually building up a complete physical exploration administrative system conforming to the special characteristics of China's oil industry according to the state decisions regarding the reform of the economic system.

In order to realize the tasks above, we must proceed from the actual situation of Chian's oil industry, resolve well the key points of the following questions and welcome the four challenges that the work of physical exploration for oil is presently faced with: deepening the work of finding oil and finding gas in the dual oil-gas accumulation zones in the eastern regions of China and continually enlarging reserves held in reserve; quickening the evaluations of oil-bearing prospects of each of the large basins in China's western regions, determining favorable oil-bearing areas, and finding large oil and gas fields as quickly as possible; utilizing physical exploration methods to look for zones where fissures have developed in the Sichuan, Ordos and other areas where fissures have developed and enlarging natural gas reserves; trying to find out a set of special seismic prospecting work methods and a set of comprehensive physical exploration methods which mainly use magnetotelluric methods for studying the lower (ancient) structural strata below the regional geological structure and the explored glide plane in the emergence areas of the large limestone tracts and in the topograhically complex mountain areas, first of all, in the southern regions of China. For these reasons, I believe that the major targets and measures for the physical exploration for oil in the 7th FYP are:

1. Raising prospecting efficiency. Starting from replacing equipment with new complete sets, lengthening the time to carry out work, increasing prospecting investment and other aspects, we must fully tap the potential of existing seismic teams, continually raise prospecting efficiency and make great efforts to be at the seismic forefront. At the same time, we must organize to some extent new teams according to the needs suitable to the development of the oil industry. In respect to equipment manufacture, we must achieve Chinese-built and lighter equipment for seismic teams as quickly as possible. We must make every effort to make fewer and more essential future equipment imports.

2. Strengthening computer management, strengthening computer processing capabilities, and shortening data processing cycles. We must vigorously develop software and do all we can to structure our own software systems. We must continually improve and raise data processing levels and provide even more information for the interpretation personnel to make clear the complex and varied geological phenomena underground.

3. Identifying accurately four great tasks: comprehensive physical exploration under new technological conditions; seismic prospecting technology under complex geological conditions; a series of research from seismic stratigraphy to lithologic seismology; comprehensive evaluation of oil and gas resources.

4. Strengthening the work of studying and popularizing new technologies, upholding the principle that science and technology are geared to production, and vigorously spreading and popularizing special processing of seismic data, collecting parameters in the field using microcomputers, digital processing of duplicate magnetic and electrical data, 3-D seismic prospecting and other new technologies. We must develop research in high-resolution seismic prospecting, vertical seismic profile prospecting methods, longitudinal and transverse wave junction prospecting experiments, geophysical modeling and elastic wave propagating mechanisms and other aspects. We must do all we can to catch up to or approach advanced world levels in field collection, data processing, result interpretation, theoretical research and other aspects.

5. Drafting a program of the training and advance training of capable people and training up a group of geological and geophysical specialists and excellent scientific research workers as quickly as possible.

13310
CSO: 4013/164

ECONOMIC PROBLEMS OF GAS FIELDS STUDIED

Chengdu TIANRANQI GONGYE [NATURAL GAS INDUSTRY] in Chinese Vol 6, No 2, 28 June 86 pp 112-114

[Article by Shi Hongxi [2457 7703 3556] of the Chinese General Marine Petroleum Company and Wu Mengfei [0702 1322 7378] of Beijing Graduate Department, Huadong Petroleum Institute: "Economic Problems of Gas Fields"; first paragraph is article synopsis]

[Text] Abstract: This article carries out a discussion on natural gas fields, especially the economic problems related to Sino-foreign cooperative gas fields. Generally, gas field exploitation needs to go through a complex process of economic study. The main reasons are: transportation costs are high, dependence on markets is heavy and the involvement by the lower end is large. The special problems of cooperative gas fields are: the scale of recoverable reserves, the means of payment, the complexity of formulating a contract gas price and so on. It is provided as a reference to the economic study of gas field exploitation.

I. General Economic Problems of Gas Fields

Natural gas and crude oil are both hydrocarbons, their use is identical and the process of their exploration is also basically the same. However, after exploration, when commercial recovery values are appraised or exploitation plans are formulated and are compared with those of oil fields, gas field exploitation must undergo an even more complex process of study. They have their own special economic problems. The main reasons are:

1. Transportation Costs are High

The physical properties of natural gas cause the transportation costs per unit heating value to be much more than those of oil and gas. For example, of Japan's CIF costs of importing crude oil from the Middle East, transportation costs comprise 5-10%, and of the average CIF costs of importing liquified natural gas, shipping costs (including liquification) comprise more than 60%. (Footnote 1)("Foreign Petroleum Industry Statistics -- Oil and Gas Exploration (separately published)" (sequel), Scientific and Technical Information and Research Office of the Ministry of Petroleum Industry, Dec 83). The exorbitant transportation costs cause large FOB discounts to be given for

natural gas. Because of this, many gas-producing countries use natural gas domestically, increase other energy resource exports or reduce energy resource imports as a basic energy resource policy. The trade volume of natural gas in the world in 1984 was only 13% of the total amount produced (of which 3/4 was pipeline gas and 1/4 was liquified natural gas).

2. Dependence on Markets is Heavy

Because it is bound by long-term supply and marketing agreements and inflexible supply systems, natural gas is not like crude oil which can easily sell on the most favorable market. In countries or regions where the natural gas industry is weak, a new market needs to be developed for almost each new gas field discovered.

3. Involvement by the Lower End is Large

The scale and speed of the gas field exploitation is restricted by the economic scale and economic life of the lower end (refers to using a natural gas project or enterprise). The natural gas output must remain steady and the period of production must often be longer than 20 years. If the extraction of this usable natural gas cannot be done according to the principle of maximum profit, it will also be difficult to do the extraction according to the principle of highest recovery rate. Thus, it can cause the gas field production costs as well as the risks related with time to increase.

Because of this, the effects of industrial distribution and regional economic development on gas field exploitation macroscopically are larger than those on a similar-sized oil field; micro-operationally, its independence and flexibility are far weaker than the latter.

II. Special Economic Problems of Cooperative Gas Fields

Aside from the differing economic problems with the oil fields mentioned above, our country's foreign cooperative gas fields also have several special economic problems generated because of cooperation with foreign businesses. Mainly, there are three problems: scale of recoverable reserves, means of payment and contract gas price.

1. The Meaning of the Scale of Recoverable Reserves

The size of recoverable reserves has completely different meanings for oil fields, gas fields and cooperative gas fields. The table below can explain this point:

The Meaning of the Scale of Recoverable Reserves

Cooperative Gas Fields	Gas Fields	Oil Fields	Commercial or no. commercial recovery value Formulate a Reasonable Exploitation Plan
			Able or Not to Sustain Export Opportunities
	Able or Not to Balance Foreign Exchange for This Project		

By principle, provided that an oil field has commercial recovery value, it can export to get foreign exchange. But, if a gas field must be able to supply gas steadily for long periods and earn a profit, there is thus a higher requirement to the recoverable reserves. To illustrate this problem, we can divide the recoverable reserves of gas fields according to their abundance into three classes:

Class A -- Large reserves, sufficient to independently sustain export opportunities;

Class B -- Medium reserves, can supply domestic use, but cannot independently sustain exports;

Class C -- Small reserves, has no commercial recovery value.

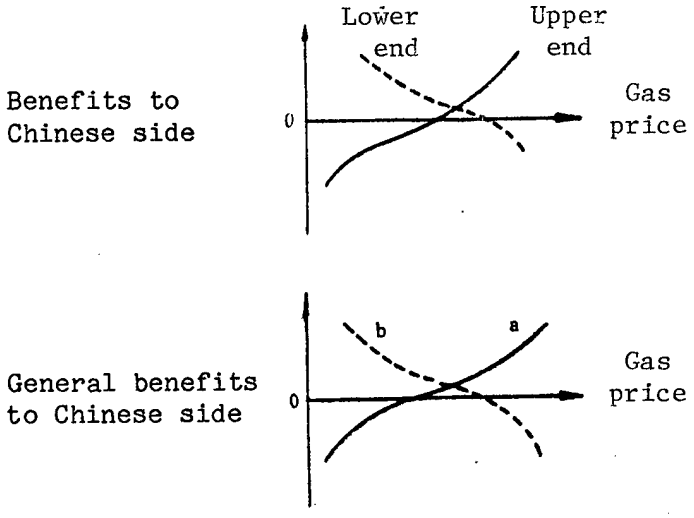
The boundaries among these three change with the geographical position of the gas field, the geological positions, the technical levels and related physical costs. Only as a factor of specific free time can a gas field be ascertained as belonging to which class. In sustaining a natural gas pipeline network, several of the Class B gas fields mentioned above could be linked up together making it able to be of a scale to export natural gas. In addition, ascertaining whether or not the reserves of a cooperative gas field can sustain exports has an especially important significance because: First, utilizing petroleum exports to generate foreign exchange is one of the aims of our foreign cooperative exploitation of petroleum reserves; second, the exploitation of the cooperative gas fields needs large amounts of foreign exchange investments, and, if the gas produced is not exported, then, speaking of these projects, enormous foreign exchange imbalances will generally be produced; third, the markets are in China and they are abroad, and they will have large dissimilar effects on the economic structure in regard to the contracts which will be consulted by both sides of the cooperation.

2. Problems of the Means of Payment

In the first and second rounds of bidding on the cooperative maritime oil fields, we used the crude oil produced as a means of payment of the foreign business's earnings (including investment and interest recovery and after-tax profits). But, in regard to cooperative gas fields, if there are no very large-sized reserves, we cannot use the natural gas produced to pay the earnings of the foreign businesses. The general situation is that the foreign businesses which participate in gas field cooperatives demand the use of foreign exchange (normally American dollars) to pay for their earnings. Because of this, there is a foreign exchange source problem. Domestic consumers of natural gas also have a problem using which kind of currency to calculate price and using which kind of currency to pay. This not only involves foreign exchange balance levels of the gas fields or the consumers, it also involves problems of who is responsible or how to share responsibility for exchange rate risks for as long as 20-30 years.

3. The Complexity of Formulating a Contract Gas Price

In the cooperative oil fields which use crude oil's calculated price to pay the earnings of the foreign businesses, artificial factors causing the contract oil price to rise (for example, setting the base price higher) is favorable to the Chinese side; objective factors leading the contract oil price to rise (for example, the effects of the world oil price going up, inflation and so on) thus cause both sides of the cooperative to obtain profits. In regard to cooperative gas fields, if the calculated price of natural gas is used to pay the earnings of the foreign businesses, then the fixed effect to both sides of the rising and falling of the contract gas price is the same as that mentioned above; however, if currency is used to pay the earnings of the foreign businesses, even if it is considered to be fixed, the effect of the height of the contract gas price to the benefits of the Chinese side is rather complex because what is now involved is: (1) the ratio of participation at the upper end by the Chinese side; (2) whether the natural gas consumers are foreign businesses or domestic enterprises; if it is a domestic enterprise is there foreign capital involvement or not, and, if there is involvement, to what degree. The relationships in regard to the gas price run opposite to each other due to the benefits to the Chinese side at the upper end (the gas field) and the benefits to the Chinese side at the lower end (as shown in Figure 1). Therefore, the general benefit to the Chinese side at the upper and lower ends will be regarded as the relationship of the proportion of participation (or investment) of the Chinese side at the upper and lower ends and the different, relative gas prices, as in Figure 2.



In Figure 2, curve "a" is the general Chinese benefit-gas price relationship under the condition that the main investment at the upper end is the Chinese side and the main investment at the lower end is the foreign business; curve "b" is thus the opposite situation, that is, the relationship when the main investment at the upper end is the foreign business and the main investment at the lower end is the Chinese side. From this it can be seen that under the

different conditions, the basic tendency (to the better) of the contract gas price of the Chinese side ought to be different. This tendency determines the basic Chinese approach to the working out of a contract gas price.

Even though the basic approach mentioned above is already set, the actual formulation of the contract gas price is very complicated. The reason is that there are many factors which influence the basic price and the regulated price formulas and that the relationship among the various factors is intricate. Of these, some factors are those which are also formulated in contract oil prices. For example: world oil price forecasts; profit levels demanded by foreign businesses; windfall profit limits and minimum price guarantees; economic structure of the contract and so on. Some factors are thus specially formulated for contract gas prices; for example, the consumer's ability to pay and the ability to pay with foreign exchange; the currency of the price calculation of the consumer's gas purchase and so on. Because of this, the formulation of the contract gas price will be even more complex than that of the formulation of a contract oil price.

13310
CSO: 4013/2

MAINTAINING DEVELOPMENT OF OFFSHORE ENGINEERING GEOLOGICAL WORK

Beijing ZHONGGUO DIZHI [CHINA GEOLOGY] in Chinese No 7, 13 Jul 86 pp 14-15

[Article by Liu Guangding [0491 0342 7844]]

[Text] China has a very long coastline and vast areas of shallow coastal waters. As there are rich submarine oil and gas resources here requiring great effort to carry out exploration and exploitation, there are still a large number of engineering geological questions demanding prompt solution. We should maintain development of offshore engineering geological work, otherwise the exploitation of the oil and gas resources on the continental shelf could be delayed, with unfavorable effects to the nation's economic construction.

1. Offshore Engineering Geological Work Not To Be Neglected

Following along with the fast development of China's socialist economic construction, especially the opening up of 14 coastal cities and the discovery of oil and gas resources on the offshore continental shelf, an unprecedented and dynamic modernization construction phase has emerged out of each of China's seas and their coastal areas. At the same time, unique yet difficult tasks confront geological workers.

Modernization construction, which includes the exploitation of submarine oil and gas fields, coal fields and other non-ferrous ore deposits, the construction of nuclear power stations and all kinds of submarine engineering facilities (cable-laying, tunneling, etc.), as well as all kinds of requirements set forth in regard to harbors, piers, dams and bridges therefrom, is closely linked to geological work, especially to offshore engineering geological investigations. Any offshore engineering construction projects takes 100 million yuan as a unit of cost calculation. If there is no complete engineering geological foundation of feasible demonstration, the consequences would be disastrous.

Everyone knows that submarine silt is subjected to the affects of ocean currents, waves, and other hydrodynamic forces and geological factors and has unstable characteristics. However, we must still understand fully the dangers that this instability can create and seek ways to overcome them. For example, the surging of heavy seas can cause rapid movement of sand,

changing the sea bottom morphology (for example, the changes of Wutiaosha in China's southern Yellow Sea and the landslips off of America's east coast); river erosion and denudation as well as silt accumulation can choke harbors, alter channels, and damage coastal landscapes; large-scale landslip movements, submarine earthquakes and the tsunamis set off by them can cause serious disasters. Aside from considering hydrodynamic conditions and loose deposit factors, for any marine engineering construction the condition of its consolidation base must be understood--just as large, imposing buildings must have firm foundations. For example, the undulations of the submarine bedrock will be a prerequisite for drilling submarine tunnels, and, along with the existence of submarine faults and fragmented zones (especially active fractures), will influence selection of a nuclear power plant sites and will even be a threat to mine shafts.

With the exploitation of the world's oceans, there have been many bitter lessons learned due to inadequate understanding of the importance of the submarine engineering geological conditions mentioned above. The large-scale landslip phenomenon off America's east coast overturned a work platform and the whole set of submarine cables in the Atlantic Ocean were almost severed due to the mud flows caused by a submarine earthquake in the Bermuda area; during offshore oil and gas activities, drilling platforms have sunk and accidents which cause loss of men and machinery are common occurrences. In our own work there are frequent dangerous situations. Our geological workers must be conscious of the importance and urgency of offshore engineering geology and earnestly draw from experiences and lessons both here and abroad, placing each construction project and each construction instance in the exploitation of the oceans on a foundation of scientific investigation and research that realistically demonstrate the feasibility of the submarine engineering geological conditions.

2. A Suggestion

According to the requirements for marine geological work in China's socialist economic construction, it is suggested that special contingents be organized for offshore engineering geological investigation and research.

For a long time, China's marine geological work has been carried out under the guiding ideology of mainly looking for submarine oil and gas resources. Speaking scientifically and technically, to serve the nation's economic construction, especially the exploiting of energy resources, this is without doubt very important. The practice of many years proves that general oil and gas surveying really does bring about the development of marine geological work. However, along with modernization's economic construction developing in depth, ever-broadening tasks and requirements have already been put out for marine geological workers, especially marine drilling work for the discovery of oil and gas on the continental shelf and for the exploitation and construction of submarine oil and gas fields. These all require that marine geological workers provide accurate and reliable submarine engineering geological data to guarantee safe construction. As for engineering geological work for cities opening up along the coasts, problems exist due to the limits of ideology and understanding and to the management system, and, although marine geological workers have initiative, it cannot be brought into play.

The exploitation and utilization of energy resources occupies a very important place in China's national economic construction. This has been generally understood by marine geological workers for 25 years. However, in the realm of marine geology, while looking for oil and gas resources, other aspects which have important significance politically and to the national economic construction must still be fostered and developed. From the standpoint of present requirements, it is very important that special offshore engineering geological contingents be quickly established and the orientation of the tasks be clear, that is, they must serve the drilling for offshore oil and gas and the exploitation of oil and gas, and they must also serve engineering and construction for the coastal cities.

Ocean geological work must be reformed. The aim of the reform is to make it active and bring into play more initiatives to serve socialist economic construction. Currently, of all the marine geological work, offshore engineering geological investigations have the most active conditions. This is due not only to its broad sphere of service but also to the nation's economic construction urgently requiring it. In the past 2 years, the engineering geological tasks put forward for the coastal and offshore regions could have been more than several tens of items each year, exceeding the tasks of the plan several times. We must enlarge the sphere of service to cover exploration and exploitation of oil and gas on the continental shelf and capital construction of the coastal cities opening up. Moreover, offshore engineering geological work of specialized contingents (companies) may completely develop through lateral contracts, and, economically, have independent accounting and assume sole responsibility for profits or losses.

Actually, in regard to the offshore engineering geological contingents, provided we adopt supportive policies, we could achieve quick development. Offshore engineering geological work could utilize advanced, modernized seismo-acoustic methods and augment with epeiric sea drilling to test and verify it. No more than two small-tonnage ships are needed to utilize these methods: one could be outfitted with positioning and navigation equipment, fathometers, stratigraphic profile equipment, lateral sonar, and high-resolution seismic equipment to carry out investigations while cruising. The other could be outfitted with drills more than 300 meters long to take core samples at predetermined points and obtain directly deposit and stratigraphic data.

However, we must recognize the shortcomings in the management systems and actively ameliorate them. For example, offshore engineering geological contingents which have already been established are an entity made up of three integral parts: seismo-acoustic investigations, epeiric sea drilling, and data interpretation. Yet, they are separated and subordinated into three independent units with people cut off from one another. As a result, there are all sorts of formalities involved in the work so that the main oil and gas work and other aspects are placed into a subordinate position, causing chronic problems in offshore engineering geological work. This situation needs to be changed.

(Ministry of Geology and Mineral Resources, Marine Petroleum Bureau)

13310/9604
CSO: 4013/1

BRIEFS

MINISTRY REPORTS OIL OUTPUT--Beijing, 13 Oct (XINHUA)--China had produced more than 700 million bbl of crude oil by the end of September, meeting 74 percent of the country's production target for this year, the petroleum industry ministry told XINHUA today. Present daily crude output is a steady 2,686,400 bbl, the ministry said, adding that this year's target of 949 million bbl may well be achieved, barring any natural disasters in the next couple of months. Since the beginning of this year, more new wells have gone into operation, following a readjustment in the nation's program of well sinking. Many new discoveries have been made in the country's second-largest oil field of Shengli in east China's Shandong Province, the Xinjiang Uygur Autonomous Region, and other areas of the country. [Text] [Beijing XINHUA in English 1546 GMT 13 Oct 86 OW] /12624

SHENGLI OUTPUT GROWS STEADILY--As of September this year, 52 oil deposits in the delta area have been discovered in the Shengli oil field, and wells have been drilled for 32 of them and put into production. The quarter output of crude oil will reach more than 270 million tons and that of natural gas more than 15 billion cubic meters. These new oil wells will make marked contributions to the economic construction of our country. During the 1983-85 period, the Shengli oil field doubled the previous figure of verified oil deposits and showed a 10-million-ton increase in crude oil output. The Gudong oil field, which was discovered in March this year and which has been built over the past 5 months has turned out 17,000 tons of crude oil each day since mid-September this year. This has enabled the Shengli oil field to make a new breakthrough in oil production. [Excerpts] [Jinan Shandong Provincial Service in Mandarin 2300 GMT 21 Sep 86 SK] /7358

DAILY OUTPUT INCREASED--Beijing, 20 Oct (XINHUA)--Since September, China's daily crude oil output has kept rising and it now stands above 2,576,000 bbl, according to officials at the petroleum industry ministry. Statistics show that China had produced more than 672 million bbl of crude oil by the end of last month, meeting 74 percent of the year's target of 910 million bbl. The officials said the fulfillment of the year's production plan will be guaranteed if there are no natural calamities. The ministry's construction funds this year were cut by 730 million yuan (about 197 million U.S. dollars), 200 million yuan (54 million U.S. dollars) less than last year, said the officials. However, they said, with newly verified reserves, crude oil output will maintain a stable growth, due mainly to improvements in management methods and technical advances. But they did not specify the growth rate. The officials said that a decline in the output of old oil fields has been checked and more investment has been made in prospecting. [Text] [Beijing XINHUA in English 0849 GMT 20 Oct 86 OW] /12624

GUDONG NOW LEADING SHENGLI PRODUCER--Jinan, 22 Oct (XINHUA)--Gudong oil field in Shandong Province, has reportedly pumped out a total of 15.69 million bbl of crude since the beginning of this year, oil field officials told XINHUA today. This means that the state investment in the oil field, 1.4 billion yuan (about 378 million U.S. dollars) in all, has already been recovered, they explained. Gudong is expected to produce 24.3 million bbl by the end of this year. Its present daily output ranks the highest among the Shengli oil-producing area's 33 operating oil fields, said Yao Baolong, an official of the oil field. By the end of the year, Yao added, its daily output will reach 131,400 bbl, or the same level as the country's third-largest oil producer, Zhongyuan oil field in central China's Henan Province. Shengli's production target for this year is 219 million bbl and by the end of September it had already pumped out 153 million bbl, Yao said. So far, 52 oil fields have been discovered in the Shengli zone, Yao said, adding that the discovery and development of Gudong will help Shengli, the country's second largest oil producing center, catch up with Daqing in northeast China's Heilongjiang Province, the country's largest. Daqing now producers more than 400 million bbl a year, accounting 50 percent of the country's total. [Text] [Beijing XINHUA in English 0737 GMT 22 Oct 86 OW]

ZHONGYUAN PRODUCTION--Since it went into production 7 years ago, the Zhongyuan oil field has produced over 21 million tons of crude oil and over 2.02 billion cubic meters of natural gas. It has submitted some 5 million yuan to the stage. [Summary] [Zhengzhou Henan Provincial Service in Mandarin 2300 GMT 3 Oct 86 HK] /6662

JILIN CRUDE OUTPUT--As of 31 August, the Jilin Provincial Oil Field Administrative Bureau had produced 1,580,640 tons of crude oil, overfulfilling the January-August crude oil production plan and showing an increase of 118,874 tons over the same period of last year, an all-time record. [Summary] [Changchun Jilin Provincial Service in Mandarin 0930 GMT 31 Aug 86 SK] /8309

PROMISING SHANDONG SOURCE--Shanghai, 26 Aug (XINHUA)--A structure believed to be oil-bearing has been found in the southern Yellow Sea, according to a bulletin jointly issued here today by the Nanhuanghai (South Yellow Sea) Petroleum Corporation of China and Cluff Oil P.I.C. of Britain. The structure was found by the two companies in their first exploratory well, drilled between 27 June and 19 August in a contract zone about 160 kilometres southeast of Qingdao City, Shandong Province. Core samples taken from the 3,423 meter well showed that there are traces of light oil in the crevices of a section of dark mud stone. Though the data are still being studied, geologists believe that the structure is an ideal one for oil. [Excerpt] [Beijing XINHUA in English 1413 GMT 26 Aug 86 OW] /6662

MAOMING PROCESSES BEIBU CRUDE--Guangzhou, 7 Oct (XINHUA)--The first batch of oil produced by an oil field in the Beibu Gulf of the South China Sea began to be processed today at a petroleum refinery in Maoming, Guangdong Province. The batch of 350,000 bbl was shipped by tanker from the Wei 10-3 offshore oil field to Zhanjiang Harbor and then piped 100 km to the refinery. With an annual refining capacity of 42 million bbl of crude oil, the Maoming refinery is the largest in south China. [Text] [Beijing XINHUA in English 1611 GMT 7 Oct 86 OW] /6662

BEIBU FIELD BEGINS PRODUCTION--Nanning, 8 Oct (ZHONGGUO XINWEN SHE)--Over 54,000 tons of crude oil from the Wei 10-3 oil field in the Beibu Wan, the South China Sea, was put on sale for the first time on 26 September, marking a shift from investment to profit returns in favor of the oil field's Chinese and foreign investors. The Wei 10-3 oil field in the Beibu Wan is the first of its kind to be developed in the South China Sea section by section and in different phases, with joint investment the China National Offshore Oil Corporation and five other companies from four foreign countries headed by the French Total Oil Company. It took the exploration teams over 6 years to complete the course from geological prospecting to trial production. At present, the oil field's average crude oil output is around 1,100 tons per day. Fine quality crude oil is now being continuously pumped from the Weizhou-a well production platform to the oil storage tanker "Hope of South China Sea" through a submerged oil pipeline. The 60,000-ton oil tankers "Daqing 257" belonging to the Guangzhou Sea Transport Administration has undertaken the first oil transport operation from the South China Sea oil field. [Text] [Hong Kong ZHONGGUO XINWEN SHE in Chinese 0330 GMT 8 Oct 86 HK]

TEST WELLS FIND OIL--Beijing, 30 Jun (XINHUA)--Two exploratory wells in the East China Sea have found oil and gas of commercial value during a seabed survey. The two wells, which were sunk and tested in April and May, are located 260 and 280 kilometers east of China's Zhoushan Archipelago. So far, seven exploratory wells have been drilled in the area since surveys began in 1974. All have indicated the presence of oil and gas to varying extent. These wells show the bright prospects for oil and gas exploration in the East China Sea, according to a bureau of the Ministry of Geology and Mineral [Resources] which undertakes the surveys. [Text] [Beijing XINHUA in English 0953 GMT 30 Jun 86 OW] /8918

NEW GAS RESERVES FOUND--Beijing, 29 Jun (XINHUA)--Chinese and foreign oil explorers have sunk a delineation oil-gas well in the South China Sea, an official of the China National Offshore Oil Corporation announced here today. He said the well is yielding 1.67 million cubic meters of gas and 315 barrels of condensate oil a day. The official said the explorers also found a new gas reservoir at the [Yinggehai] site. According to the official, the reservoir could pump up to 900,000 cubic meters of natural gas and 441 barrels of condensate oil daily. "The new well shows that there are bright prospects for oil exploration in the area," he said. The well was drilled jointly by the China Nanhai West Oil Corporation ARCO China of the United States, and Santa Fe Minerals (Asia) of Kuwait. Oil exploration in the area began in September 1982. [Text] [Beijing XINHUA in English 0947 GMT 29 Jun 86 OW] /8918

FIRST SEMI-SUBMERSIBLE CERTIFIED--Shanghai, 25 Sep (XINHUA)--The first Chinese-built semi-submersible offshore oil drilling rig, capable of operating at a water depth of 35 to 200 meters, passed a state assessment here today. The rig, Kantan (Survey) No. 3, has drilled two explorary wells in the East China Sea off Shanghai since it was completed by the Shanghai Shipyard in July 1984. One well is 5,000 meters deep, the deepest in China. The rig--100 meters high, 91 meters long and 71 meters wide--can drill 6,000-meter-deep wells and operate normally in severe gales and rough seas. It is now being used by the Marine Geological Survey Bureau of the Chinese Ministry of Geology and Mineral Resources, and has met the standards set by the Chinese Marine Classification Society and the American Bureau of Shipping. [Text] [Beijing XINHUA in English 1638 GMT 25 Sep 86 OW] /9738

CSO: 4010/8

HARBIN SELECTED AS SITE OF 450MW NUCLEAR HEATING PLANT

SK100940 Harbin HEILONGJIANG RIBAO in Chinese 26 Oct 86 p 1

[Text] The State Scientific and Technological Commission has recently selected Harbin as a city to conduct joint research for building a low-temperature heat reactor. The Harbin City People's Government held the first meeting of the leading group for this project on 24 October.

Building a 450,000-kilowatt low-temperature heat reactor, the first of its kind in China, is one of the state's major scientific and technological joint research projects during the Seventh 5-Year Plan period. This project will have the capacity of supplying heat to a building complex covering an area of 10 million square meters. Harbin City is an ideal place for conducting joint research for this project, because it is located in China's northern border area where the heating period is very long, energy resources and transport facilities are insufficient, and environmental pollution is serious. Another reason is the construction of the subsidiary project of the Yilan large-scale coal gas project in Harbin. With the support of the state and the provincial authorities in many fields and thanks to the full cooperation of the nuclear research institute of the Qinghua University and the Beijing Iron and Steel Design Institute, Harbin City has made many preparations for the first phase of the project and has issued a technical and economic appraisal report on this project. In July this year, the State Scientific and Technological Commission formally approved the feasibility study on this project, and selected Harbin City as a joint center for researching this project.

On 24 October, the leading group for this project held its first meeting. Attending and addressing the meeting were leading comrades of the nuclear energy section of the State Scientific and Technological Commission, the State Nuclear Safety Administration, and the Northeast China Economic Zone Planning Office under the State Council. They said: Exploiting nuclear technology and using nuclear energy for peaceful purposes will make nuclear energy an ideal heat source which causes little pollution and yields good results. Thus, there will be good prospects in this regard. Leading comrades of the state and the pertinent provincial departments have praised Harbin City for its resolution and foresight in building the low-temperature heat reactor before others.

When speaking at the meeting, Gong Benyan, mayor of Harbin City and director of the leading group for this project, said: Exploiting nuclear energy to solve heating problems for urban areas is an important measure for strengthening basic urban facilities, and many fields will gain benefit from this project. I hope that this project will gain support from various fields so that it can be built faster.

/9604
CSO: 4013/13

NUCLEAR POWER

DAYA BAY PERSONNEL UNDERGO RIGOROUS TRAINING

Beijing RENMIN RIBAO (OVERSEAS EDITION) in Chinese 4 Sep 86 p 4

[Article: "Plans for Training Personnel of the Daya Bay Nuclear Power Plant Well-Considered--Working Personnel Divided Into Three Categories, Receive Training Here and Abroad--Foreign Specialists Responsible for Supervising and Training Staff"]

[Text] A leading cadre of the Guangdong Cooperative Nuclear Power Company said in introduction to a reporter of this paper today that there are rigorous and comprehensive plans of training for personnel in charge of the management, operation, examination and repair and other work at the Daya Bay Nuclear Power Plant.

These plans are: chief directors and chief operators will be trained completely in France, and of these, 24 people will be required to attain the standards to operate the same type of nuclear power plant in France; foreign experts experienced in managing nuclear power plants will be the managers of the production department for the first 5 years and during the period of operation will have full power and responsibility in supervising and training the staff, in addition, there will be one Chinese specialist as a deputy to the chief and after 5 years the duties of both sides will be exchanged; operating personnel must periodically use a simulator to carry out training.

All working personnel at the nuclear power plant are divided into three classes, each according to the requirements to carry out training. Trainees entering the first class must be university graduates and have a certain operational experience. These people will be trained to become the management backbone of leadership at each level, including chief and deputy directors, chief and assistant control room operators, on-duty technical advisors during operation, professional engineers, training instructor and simulator instructor, health care personnel and so on. After the personnel of this first class is divided into two groups domestically and undergo nearly 2 years of training, they will again go through selection and then be sent to France to be trained. The first group will first select 47 from the 64 people who will have already had the domestic training, and the second group select 29 people from among the 48 people.

Entering the second class there will be 260 people who will receive training, and, after being trained domestically, will become operators, professional technician assistants, technicians and foreman of each work classification.

There will be 255 people who will be class three personnel. They will take training to become technicians in each work classifications and other staff.

13310/9604
CSO: 4013/4

SUPPLEMENTAL SOURCES

DACHEN ISLAND: CENTER FOR EXPERIMENTAL ALTERNATIVE ENERGY STUDIES

Hangzhou ZHEJIANG RIBAO in Chinese 15 Jun 86 p 1

[Article by Li Liang [2621 5328], Staff Reporter, and Wang Jiangjie [3076 3068 3381] of the Reporting Group of the Municipal Party Committee: "Fourteen Scientific and Technological Development Projects Being Completely Implemented on Dachen Island--Developing and Utilizing New Energy Resources and Fishery Resources Are Key Points"]

[Excerpt] On the afternoon of 8 June, a 20 kW wind generator, after undergoing readjustments, began a trial run on Dachen Island of Jiaojiang City. Up until this, the 14 scientific and technological projects whose key points were developing and utilizing new energy and fishery resources had already been completely implemented on the island where the Laoyinhuang Brigade members did the difficult pioneering work. Moreover, they have begun to receive good economic, social, and ecological benefits. Not long ago, this island was among the national scientific and technological development demonstration islands.

Dachen Island has abundant natural resources. Ever since Comrade Hu Yaobang issued his three important instructions on the work on Dachen, prefectural and city leadership has paid great attention to the development and construction on Dachen Island. Taizhou Prefectural Party Secretary Wei Xiajiu [7614 1115 0036] has come to the island eight times to make on-the-spot investigations and to give guidance. Jiaojiang City has organized special leadership groups to lead the scientific and technological development projects on Dachen Island.

Investigation has shown that the wind energy, tidal energy and other new energy resources on Dachen Island are especially abundant. Each year the effective wind energy time is more than 7000 hours and it belongs to a Category 1 region of China. It also has four places where tidal generator harbors can be built. Last year, under the help of the Science and Technology Office of the Provincial Machine-Building Department, Dachen Island installed two wind generators and the trial runs amounted to 200 hours. The daily amount of electricity generated comprised one-third of the amount of electricity used on the island and, after being fed into the network with the diesel generators, a good oil and energy savings benefit came about. This year, comrades from the Science and Technology Office of the Provincial Machine-Building Department have also come to

the island many times, have made design readjustments, have changed the installed angles, have resolved problems of high windspeed start-up which appeared in the trial runs, tower sway and other problems, and have extended the time for utilizing wind power. At the Zhongzui Tidal Power Station on Dachen, preliminary topographic survey, geological drilling, and tidal survey work has already been completed. Small solar energy generating stations, solar energy water hearings, methane-generating pits, and other new energy resources of many kinds have already begun to be brought into play.

13310/9604
CSO: 4013/4

SUPPLEMENTAL SOURCES

LONG-RANGE ALTERNATIVE ENERGY PROGRAM BEING DEVELOPED

HK020207 Beijing CHINA DAILY in English 2 Oct 86 p 1

[Article by staff reporter Guo Zhongshi]

[Text] China's first long-term program for the development of "alternative" energy is being mapped out with the goal of doubling energy savings by the year 2000.

"Alternative" energy, mainly solar, wind, biological, thermal, and ocean power, is expected to save the conventional energy equivalent of 20 million tons of standard coal in 5 years and 48 million tons by the end of the century.

By then, the new energy sources will supply at least 4 percent of the country's commercial needs and 10 percent of its total rural energy, according to the plan now being drafted by the State Commission of Science and Technology.

"It will help immensely in easing the strain of energy shortages in China, particularly in mountainous regions, islands, and areas devoted to animal husbandry," said Zeng Xianlin, vice-chairman of the commission.

The focus of developments varies in different areas with different resources. Solar energy is at the top of the development agenda in western and northern parts of China, where energy shortage are acute.

The south will mainly develop biogas--gas produced organically--as the region's temperatures are high and agricultural residue is often wasted. Windmills will be used in coastal areas and Inner Mongolia, while Tibet, Yunnan, Fujian, and parts of north China will concentrate on geothermal power because of their abundant underground resources.

Zeng said China had achieved some success in improving new energy technology. The country has installed more than 15,000 wind converters in the west. Inner Mongolia and coastal areas and the production of Chinese-made solar-powered batteries has replaced a $1.7-million import plan.

More than 100 of the 3,000 proven geothermal power sites are being explored for breeding, heating, and growth of vegetables, fruits, and aquatic products, Zeng said.

"A network of new energy enterprises is taking shape across China with more than 70 research institutions and 2,000 scientists and experts," he added.

But, he said, there were some problems with development. Production, research, exploration, and experimental work has been duplicated too often because of the lack of general guidance, central funding and co-ordination.

Imports by some enterprises are getting out of control and firms are ignoring domestically-produced raw materials and market demands. Last year, he said, a dozen solar-powered battery production lines were imported by different organizations.

The country still lags behind the world's more advanced technology in production, equipment, quality, and price, Zeng said.

To solve these problems, close cooperation between production units, research institutions and colleges and universities is needed, particularly between military industry and civilian enterprises.

He urged business and local government leaders to pay attention to the development of "alternative" energy and devote the necessary funds and manpower to new power sources which he said were "indispensible to human life."

As the world recovers from its energy crisis, the size of the potential market in China is very attractive to foreign firms and is very favourable to China, which is seeking cooperation with the world energy industry, Zeng said.

Last year, China received millions of dollars in aid from the EEC countries for several energy cooperation projects.

/7358
CSO: 4010/2

SUPPLEMENTAL SOURCES

ENERGY-EFFICIENT STOVES HELP EASE RURAL ENERGY SHORTAGE

OW051034 Beijing XINHUA in English 0825 GMT 5 Nov 86

[Text] Beijing, 5 Nov (XINHUA)--China has developed new stoves capable of saving up to half the fuel now consumed in rural households, according to a rural energy specialist.

"These fine quality fuel-saving stoves passed national inspection in 1982, and have proved to be an effective means in easing rural energy shortages," said Geng De, deputy director of the Chinese Academy of Agricultural Engineering Research and Planning.

Out of China's 180 million farm households in more than 2,000 counties, about 40 million have been using the energy-efficient stoves. China plans to install the stoves in another 30 million households by 1990.

According to Geng De, "every household can save 1 ton of fuel a year by using the new inexpensive stoves, which cost only about U.S.$3.

In China's countryside, cooking time of 2 to 3 hours is necessary to prepare a decent meal for guests, with the amount of fuel consumed sometimes 10 to 15 kilograms for a single dinner. For a long time, China's rural dwellers used inefficient fuel-eating stoves for cooking and heating.

People living in crop-producing areas rely on stalks, forested areas on wood, and grazing areas on grass and livestock manure to meet energy demands.

Geng said, "Of China's 800 million rural residents, about 200 million lack sufficient energy for about 5 to 6 months every year, and people are forced to dig up grass and fell trees, breaking the ecological balance and affecting agricultural production."

He said the current solution to the problem is to spread fuel-efficient stoves and to plant more forests to supply fuel.

China has 960 million hectares of land, with only one-tenth arable, and the majority of land is left uncultivated. Rural energy specialists believe that people can plant fuel supplies on deserted slopes, in corners of villages, around ponds and on other small uncultivated areas.

Trees planted for fuel are fast-growing, and they can be used in the same year they are planted. Farmers can grow, maintain, and harvest their own fuel supplies. By recycling unused stalks back to the fields, soil fertility can be improved.

Besides spreading energy-efficient stoves and planting more fuel supplies, China also advocates developing energy resources in line with the unique natural environment of each area. This has been applied in the use of solar energy in China's north-west areas, the utilization of wind power in Inner Mongolia, the use of tidal energy and wind power in coastal areas, the construction of small hydropower stations in China's southern provinces and the use of biogas in other areas.

Energy supplies for the processing industry, vegetable-growing and fish-raising activity and heating are supplied by tapping geothermal resources in northern China and Tibet.

Thanks to these extensive measures, China saved an equivalent of 20 million tons of coal from 1981 to 1985.

/9604
CSO: 4010/12

CONSERVATION

RURAL CONSERVATION EFFORT HAILED AS SUCCESS

OW291931 Beijing XINHUA in English 1555 GMT 29 Sep 86

[Text] Beijing, 29 Sep (XINHUA)--China has saved the equivalent of 20 million tons of standard coal by rural energy conservation in the past 5 years, according to the Chinese Science and Technology Commission.

"The success is attained through the extension of fuel-saving stoves, biogas stoves, and solar cookers, the restoration and increase of fuel forests, the setting up of small wind and hydropower plants, and the use of geothermal wells," said Tao Dinglai, vice-president of the Chinese Society of Agricultural Engineering.

According to Tao, China now has 40 million rural households using fuel-saving stoves, and 25 million using biogas. By 1985, the number of small hydropower plants in China reached 74,000, providing 7 percent of China's total annual power capacity.

In 1981 and 1985, China developed 2.3 million hectares of fuel [forests]. Solar stoves reached 100,000 and small wind-powered generators totaled 15,628; 70 out of the 2,700 discovered geothermal resources have been utilized.

"These efforts to a great extent have eased rural energy shortage, protected forest vegetation and preserved soil quality," said Tao.

/7358
CSO: 4010/2

- END -